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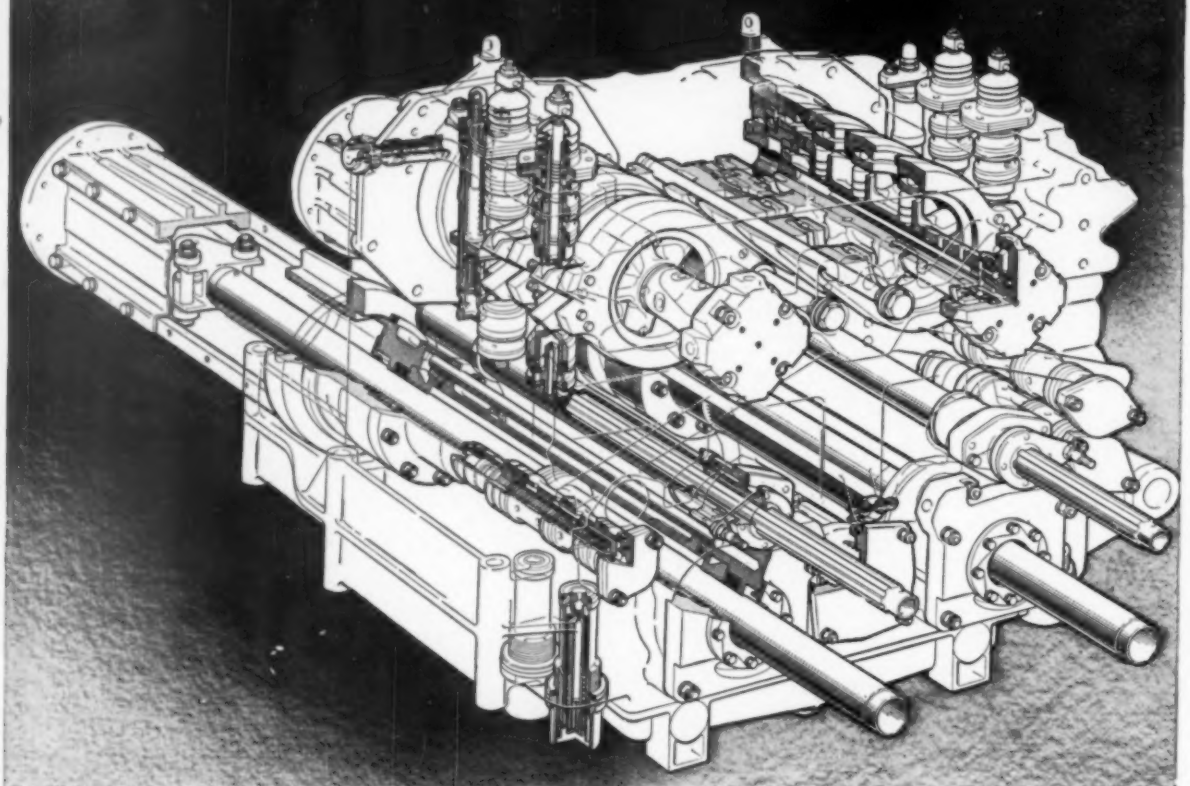

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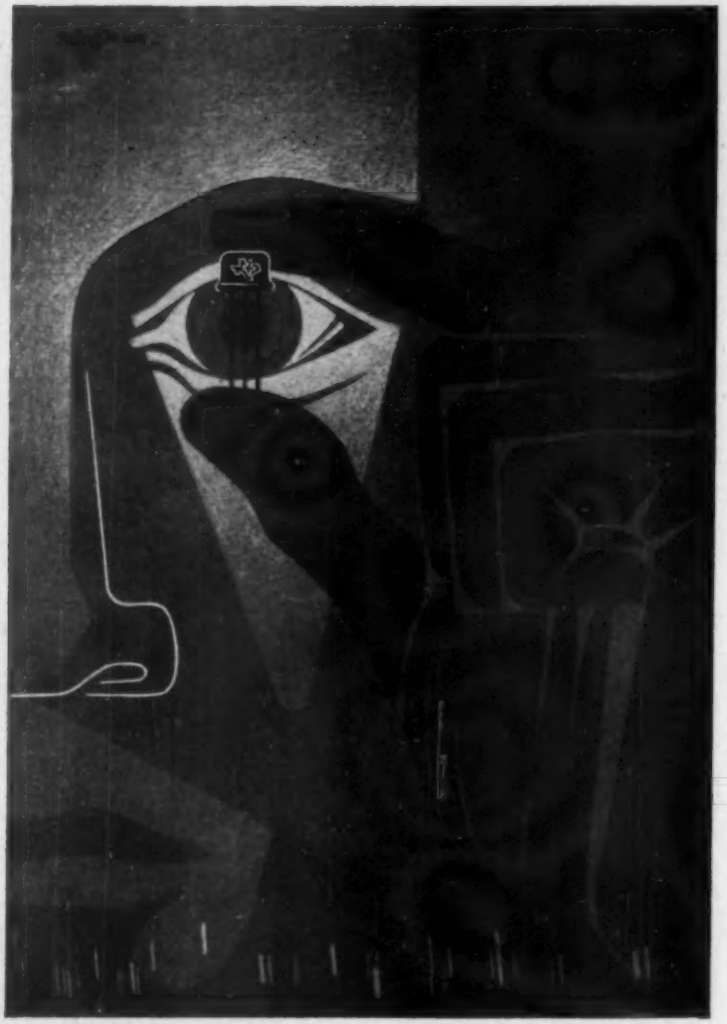

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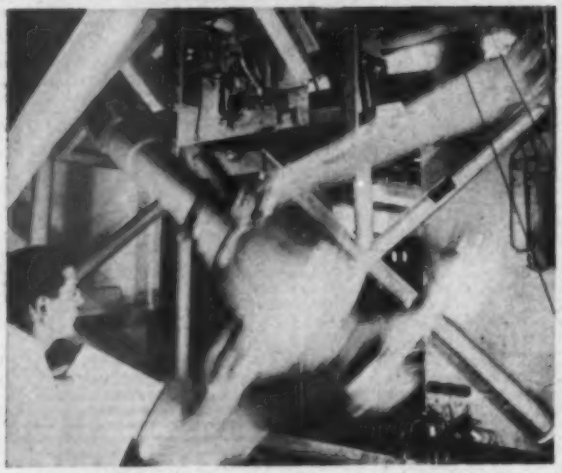

8,000 CYCLES. Structural integrity beyond that of any other transport aircraft was designed and built into the Boeing 707—and proved out in four years of prototype test-flying and ground testing of components. Landing gear, above, completed 8,000 test operating cycles.

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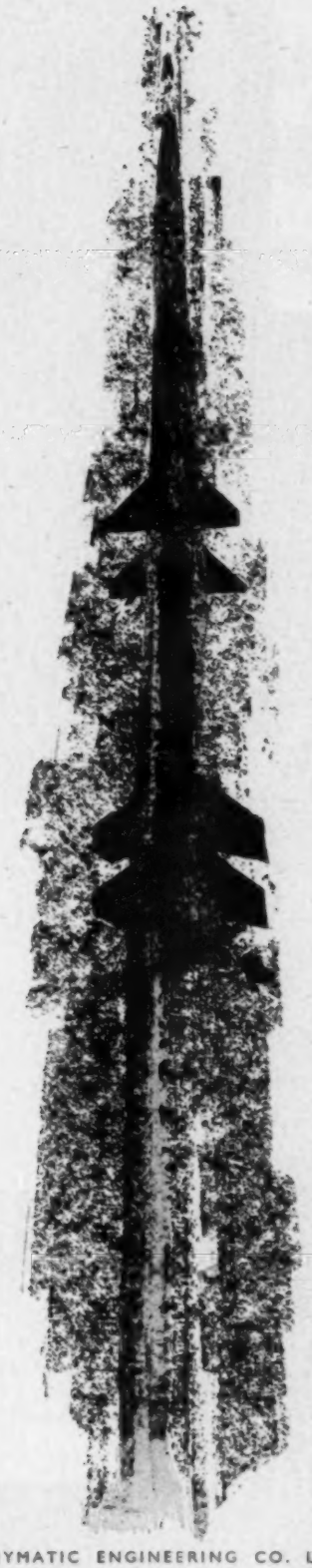

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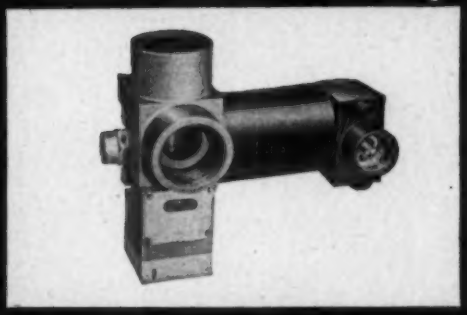

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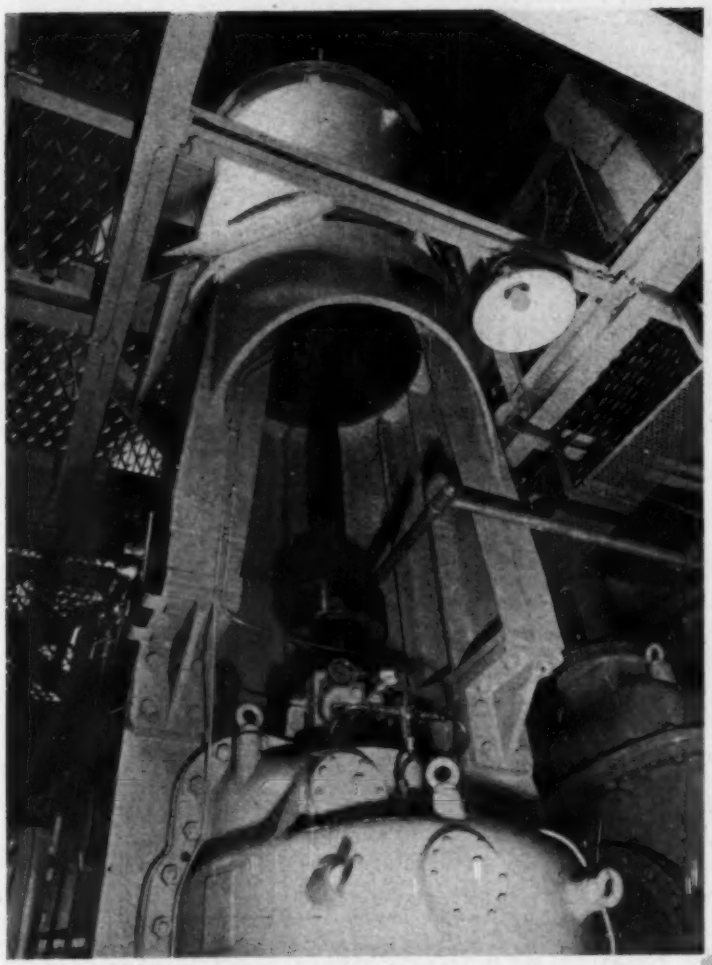

Sigmund Vertical spindle split-case units chosen for Rolls-Royce new High Altitude Aero Engine Test Plant at Derby.

The supply of main cooling water pumps for the new Rolls-Royce plant at Derby, has once again resulted in an important order being placed with the Team Valley, Gateshead firm of Sigmund Pumps, manufacturers of an extensive range of pumping equipment, whose claim 'Sigmund Pumps when only the best will do' is further endorsed by this order which they are proud to have executed.

Three Sigmund vertical spindle split case pumps, Sigmund Type WS-Q, are now installed in the new Rolls-Royce plant at Derby. The units have a total capacity of 1,800,000 g.p.h. against heads of 110 feet and are driven by vertical spindle electric motors developing a total of 1,350 h.p. running at 975 r.p.m. and operating from a high tension supply of 6,600 volts. Pump suction and delivery branches are, respectively, 24 inch and 20 inch and each unit is independently self-supporting. The motors are mounted on distance pieces in order to raise them to the necessary height and are completely independent of the motor room flooring.

The pumps and ancillary equipment were designed to operate satisfactorily without an attendant, the controls being centralised in the pumphouse control room.

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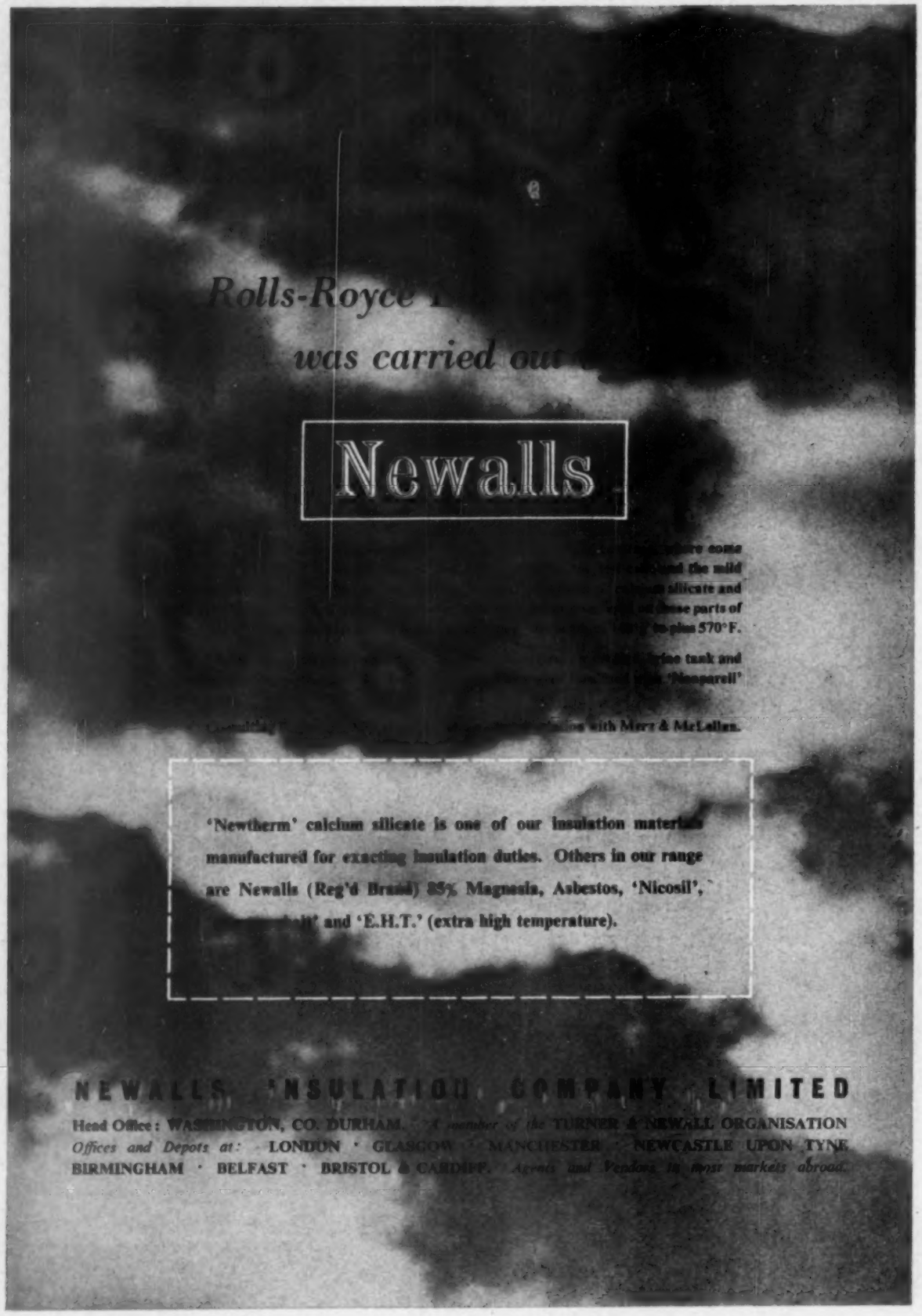
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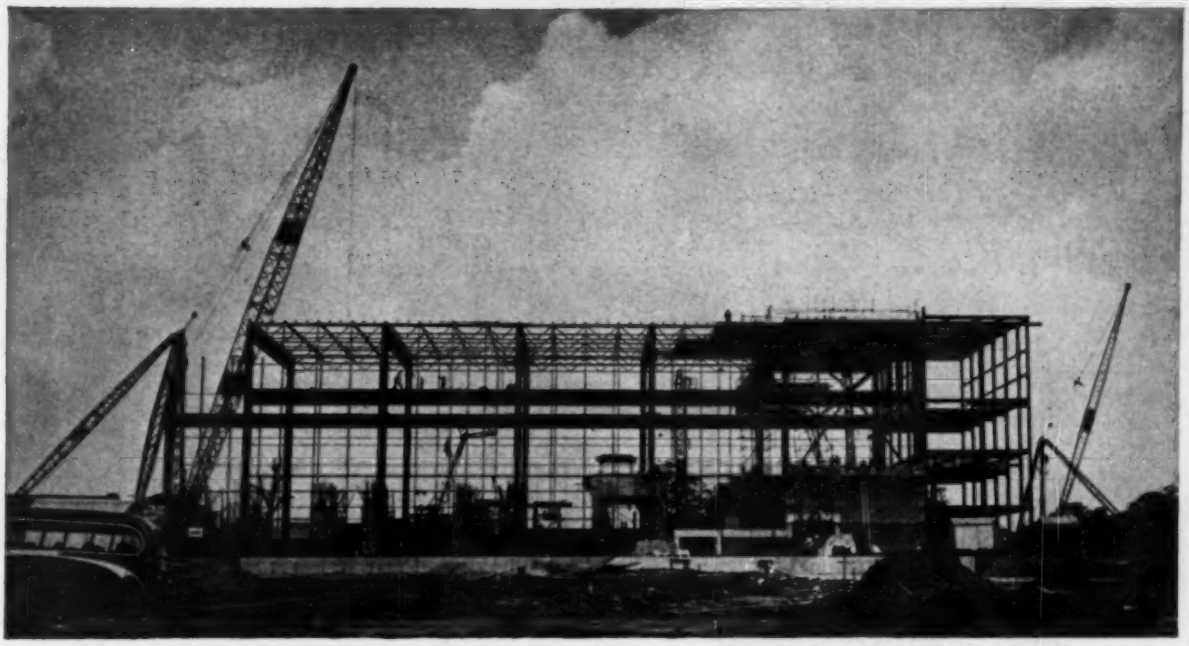

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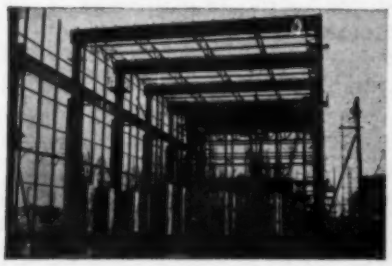
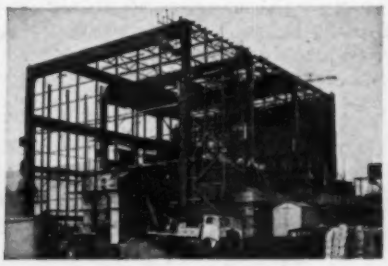
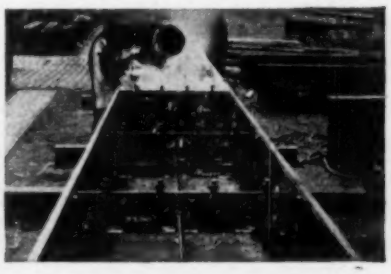
HIGH ALTITUDE TEST FACILITY AT DERBY







The buildings which comprise the new High Altitude Test Facility of this world-famous company, are of all-welded rigid frame construction. The total weight of steel involved is approximately 1,200 tons. Consulting Engineers:—McLellan & Partners in association with Merz & McLellan. Consulting Civil Engineers:—R. T. James & Partners.

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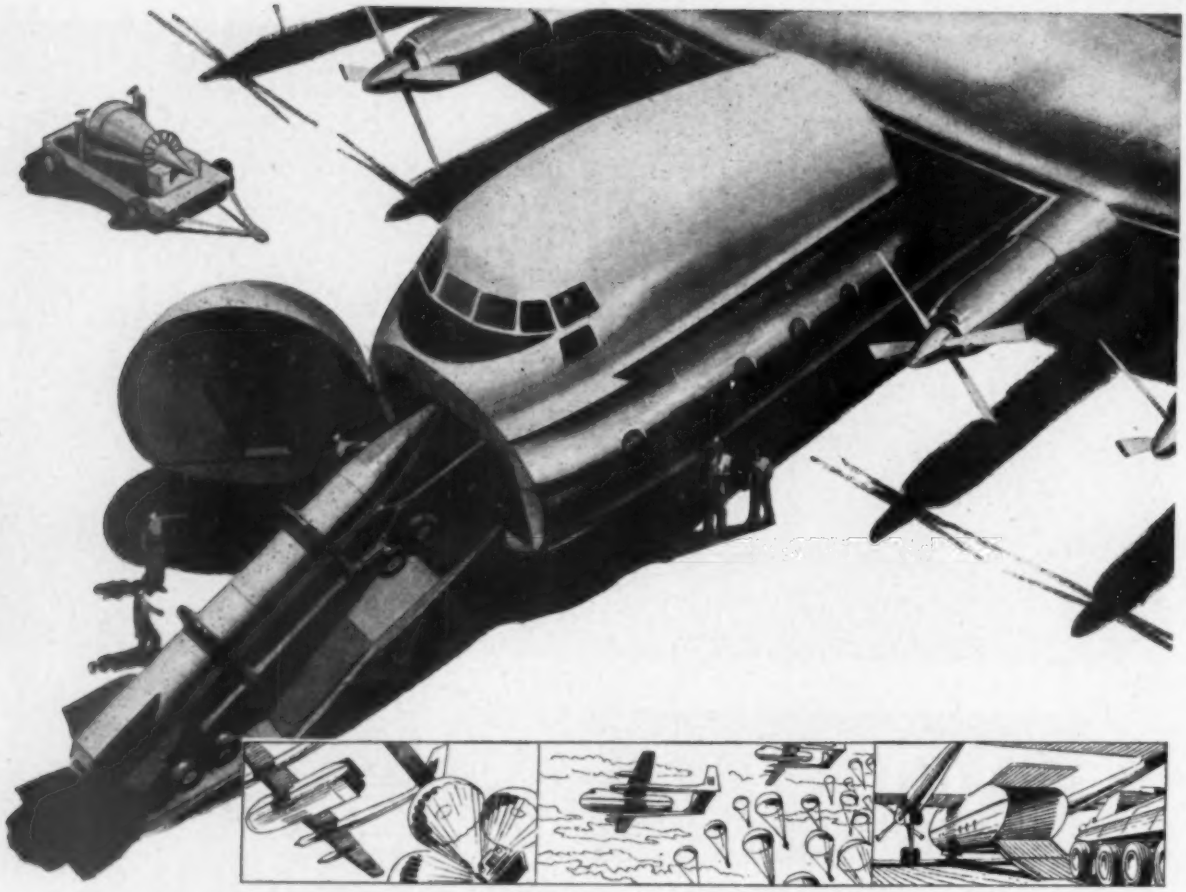

A.W.660 – New kind of Transport for the New kind of Army

As weapons grow more complicated and bulkier, as the pace of military action increases, the need for such a transport as the AW.660 becomes vital. Powered by four Rolls-Royce Dart engines, the AW.660 is a medium-range aircraft, cruising at 300 m.p.h. It can carry over 13½ short tons of the most bulky equipment needed by a modern fighting force. The wide, fully-pressurised fuselage will take armed troops, radar equipment, guided weapons, wheeled vehicles and all the necessary stores of a mobile military unit. The Beaver Tail rear doors may be opened in flight for supply-dropping by parachute. On the ground the bottom half of the Beaver Tail is lowered to form an integral loading ramp. The AW.660 can readily be operated from makeshift airfields.

The AW.660 provides mass transport in the minimum of time. It can play a vital role in a world whose freedom may depend on high mobility of forces and equipment.

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FIRST AERONAUTICAL WEEKLY IN THE WORLD FOUNDED 1909

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and
AIRCRAFT ENGINEER

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In this issue

541 The Croydon Closure
543 The Fare-differential Controversy
544 The Bristol Scout (Part 2)
547 McDonnell F4H-1
548 Clouds and Canvas
551 Altitude Plant
556 Slingsby Swallow

Faith Reaffirmed

THE award of an airworthiness certificate to the de Havilland Comet 4, imminent as this page of *Flight* went to press, is an achievement in British aviation which commands more than formal recognition. The touch-down witnessed last Saturday evening at Hatfield marked the end of something more than 100 hours of world proving-flights; it was the culmination of the most salutary 50,000 hours in 40 years of British air transport.

As the pages of this journal have chronicled over the past nine years, the Comet has experienced the best and the worst that fortune and fate could dispense. In 1952 and 1953 it was supreme among airliners; in 1954, following two terrible tragedies, it was the object of the most radical heart-searching ever known in engineering history. Throughout it remained the symbol of Britain's competence in, and mastery of, aviation—the most unforgiving of man's technical accomplishments.

The Comet heralded a new age of more efficient, more comfortable, more attractive air transport, an age on whose threshold the airlines now stand poised. It pioneered also fundamental advances in structural science—advances which, as foreign engineers have acknowledged, might not yet have been made. And it caused those in this country who set the aeronautical pace, and those others who prescribe the standards to which all shall adhere, to be sounder in judgment and more respected for their values.

Britain's Comet has come back; and in welcoming it and wishing it well we collectively salute de Havilland for their unfaltering belief in their creation; the worth and integrity of B.O.A.C.'s partnership; the steadfast support of the Government and of its skilled servants in the R.A.E. and the A.R.B.; the perfect record of R.A.F. Transport Command's Comet 2 squadron; the Royal Navy's nigh-incredible feat of salvage four years ago; and, last but not least, the excellence of the 1,000-hour life Rolls-Royce Avon turbojets. Such a catalogue of congratulation is appropriate on only the rarest of aeronautical occasions.

Death in the Picture

DAY-BY-DAY reporting of British air news in recent weeks must have commanded a growing respect throughout the aircraft industry. Certainly it has done so among members of the staff of this journal, whose task it is to present the momentous happenings in civil and military aviation in assimilable form. We have watched with unfeigned admiration some of our colleagues in Fleet Street grappling with the intricacies of the fare-differential imbroglio and introducing a great new story of the Comet saga. How regrettable, then, that many of the journals which print the enlightened writing of these men should have considered it necessary, in their own interests, in the public interest, or both, to publish close-up pictures of a sinking Scimitar—pictures fraught with tragedy of a particularly poignant and personal kind.

It is no part of *Flight's* duty to teach Fleet Street its own business or to debate a moral issue that should cause the whole nation to search the depths of its conscience. But it is very much our job to comment on matters of aeronautical moment, whether they concern men or machines. There was a man in this case —one of the most experienced naval pilots of his time, and of such calibre that he was given a special command. That command was the leadership of the Royal Navy's first Scimitar squadron; and the Scimitar is the aeroplane that caused the Fleet Air Arm to carry its head especially high at Farnborough this year. After Farnborough the squadron was looking forward to getting to sea as the crack unit of the re-commissioned carrier H.M.S. *Victorious*; and to mark the occasion Press and TV cameramen were invited aboard—in the belief that the British public would be as interested in deck landings by big new twin-jet fighters as they apparently have been in the business of the air transport companies. But death came into the picture, and the rest is only too well known.

There is no more to be said, on this page at least, but much to be regretted.

FROM ALL QUARTERS

Formosa Air Action

IN a communiqué issued after an air action over the Formosa Straits on September 24 the Chinese Nationalist Air Force claimed to have shot down ten Communist Mig-17s and probably destroyed two more. Over a hundred Mig-17s had been encountered by 32 Nationalist aircraft (F-86s), and all the latter were said to have returned to base safely.

From the reported numbers involved, this was the largest air action since the Far East crisis began five weeks ago; and when the head of Nationalist Air Force intelligence, Gen. Fu-en, was asked how 32 Sabres could take on a superior force of Migs and defeat them so thoroughly, he referred to the record of U.S. airmen in Korea, where victory was credited to superior training.

Numerous successes against Mig-17s have been claimed by Nationalist Chinese pilots using F-86 Sabres armed with Sidewinder infra-red homing missiles. If this report is correct it marks the first occasion on which guided weapons have been employed in air combat.

Sweden Buys the Bloodhound

IT was announced on September 24 that the Royal Swedish Air Board have placed an order with the Bristol Aeroplane Company for the Bloodhound guided-weapon system. This is the first export order gained by any British guided weapon, and it represents a major victory after a protracted sales battle.

Bloodhound is a surface-to-air system incorporating a missile designed and built by Bristol Aircraft, with twin Thor ramjet engines by Bristol Aero-Engines and semi-active homing radar guidance by Ferranti. B.T.H., Decca Radar, E.M.I. Electronics and M.L. Aviation are also major sub-contractors to the system, which involves the largest force of engineers and technicians devoted to any missile under development in Europe. Bloodhound is stated to have a longer range than any other semi-active homing weapon, and it is in production for Fighter Command. No details of the size of the Swedish contract are revealed.

The Arrow's Future

ON September 23 the Canadian Prime Minister announced that the Dominion had decided to adopt the Boeing IM-99 Bomarc area-defence missile system which, tied in with the SAGE network, will be operational by 1961.

It has been suggested that this combination will replace the Avro Aircraft Arrow intercepter, but such a contention is entirely premature. The Astra fire-control system and the Sparrow II air-to-air missile—both parts of the Arrow weapon system—have indeed been cancelled, but the aircraft itself is still a firm project and may well see service with the R.C.A.F. and possibly other countries, perhaps in rôles other than its original one of all-weather intercepter.

At present 37 Arrows are being built, and the total system-cost, up to the beginning of September, amounts to $303m. Completion of development and the manufacture of about 100 aircraft for squadron service would cost about another $1,250m, and there is a widespread feeling in Canada that the cost per usable aircraft is uneconomically great. A decision to procure Arrows for squadron service will be taken on March 31 next.

Commenting upon the Prime Minister's announcement, Sir Roy Dobson, managing director of the Hawker Siddeley group and chairman of A. V. Roe (Canada), Ltd., confirmed on September 25 that the programme had not been cancelled.

Sir Roy added: "On the contrary, the Prime Minister's statement says the development programme is to continue and will be reviewed next March. The programme as it now stands involves the building of 37 aircraft and an appropriate number of engines. This situation remains unchanged. . . . We are convinced that when the review takes place next March the Arrow will be ordered into production."

Sir Roy said that reports that 2,000 people were to be laid off at Malton were erroneous. "If the statement of the Prime Minister is read properly, the 2,000 people affected are employed on the Astra fire-control system and Sparrow missile."

Croydon and Biggin Hill

LAST Monday's statement by the Croydon Airport Users' Association, given in detail on page 541, has brought into the open the whole question of the future of Croydon (scheduled to be closed on December 31) as it affects the three main groups concerned. These groups are the user-operators, the Ministry of Transport and Civil Aviation, and the local authorities.

The opinion of the operators is that the Biggin Hill terms are "utterly and completely unacceptable." An examination of the Air Ministry's requirements confirms that the Croydon users are not unreasonable in making their strong protest. Also valid are their reminders that the Minister of Transport and Civil Aviation is obliged by law to further the development of civil aviation.

It is worth noting that the M.T.C.A. decision not to continue to operate Croydon Airport does not necessarily imply its closure. The Commandant of Gatwick Airport told members of the Aerodrome Owners' Association last week that the continued use of Croydon, as such, was not affecting the use of Gatwick. The operation of Croydon by a private or municipal body remains a possibility which has not yet been explored.

Previous M.T.C.A. statements have claimed a strong demand from local authorities for the Ministry to sell Croydon and for the land to be made available for other purposes. According to information from local councils concerned, this may not be the case. There has been no doubt about the support for the continuance of the airport at Croydon voiced by local private organizations such as the Croydon and London Chambers of Commerce.

The Prime Minister at Rolls-Royce

"IN the industrial sphere we in this country have a lot to be proud of. We must never get complacent. Britain's trumpet sometimes remains unnecessarily unblown . . . but I think this mutism can be carried too far. So I enjoy giving an occasional toot. I am tooting now."

In these words the Prime Minister, Mr. Harold Macmillan, prefaced a brief but striking list of British achievements. He was addressing guests at luncheon after formally opening the new Rolls-Royce high-altitude test plant (subject of an illustrated feature on pages 551-554 of this issue) at Derby last Friday.

The Prime Minister continued: "In the peaceful use of atomic energy we lead the world. We pioneered the application of the gas-turbine engine to aircraft propulsion. Radar was primarily a British invention. We have pioneered the development of several outstanding synthetic fibres and plastics. There are many such achievements, and we intend to do better still."

Recalling Rolls-Royce history, the Prime Minister said that

TRIUMPHANT COME-BACK: The scene at B.O.A.C.'s base at London Airport last Tuesday morning as the Corporation's first de Havilland Comet 4, piloted by John Cunningham and complete with its newly awarded Certificate of Airworthiness, was delivered from the maker's factory at Hatfield. Among those on board was Sir Geoffrey de Havilland, who formally handed the aircraft over to Sir Gerard d'Erlanger, chairman of B.O.A.C., at a subsequent ceremony. A second aircraft has also been delivered and two more may follow by the end of this week.

TRAINER/TRANSPORT: First flight of the North American Sabreliner utility trainer and transport. Though seating ten, the Sabreliner is smaller than the F-100 and weighs only 15,330 lb. The turbojets are G.E. J85s, each of 2,000 lb thrust.

Sir Henry Royce started as a newspaper boy at Clapham Junction. Later, he set off on foot for the North, and his first works were in Manchester. Now, 52 years after the birth of Rolls-Royce, Ltd., they had this great organization with 42,000 employees. Last year the company's export sales amounted to £33 million—over 70 per cent of the export sales of the British aero-engine industry.

Mr. Macmillan had been introduced by Lord Kindersley, Rolls-Royce chairman, who said in a brief speech that Mr. Pearson [chief executive and deputy chairman] was responsible for the company's facilities at home and abroad and he, Lord Kindersley, would accordingly call upon him to welcome the guests.

Mr. Pearson said that the visitors had been invited not only to inspect the new high-altitude plant but also to see the wealth of other equipment which was believed to represent the minimum necessary to retain the company's position in the world's aero-engine business.

"That position today," continued Mr. Pearson, "can best be defined by a few facts. We employ 35,000 people in the manufacture of aero-engines and of these 8,000 are employed on research, design, and development work, which makes us one of the largest aero-engine manufacturers in the world. Over half the aircraft powered by gas turbines which are in use or on order by the world's airlines are powered by Rolls-Royce engines. The military forces of over 20 countries use our engines, and these are manufactured in five countries.

"As we move into the future, however, with civil engines tending to depart from those types which have military applications, the Government understandably expect to see a reduction in their share of the cost of development, with a corresponding increase in our share. All that we would ask, Prime Minister, is that your Government should not force the pace . . . to the point where it will place such a financial load upon us that it will destroy our ability to maintain our hard-won position in the international world market.

"I would go so far as to suggest that there is no better form of export for this country than aero-engines—they represent the export of our engineering brains and skills of all our workpeople; they use a very small content of imported raw material; they encourage developments which penetrate other industries to their ultimate advantage; and, by no means least, they carry a high prestige value as the symbol of the highest quality of precision engineering.

"I have acknowledged the contribution which the Government defence programmes have made in the realm of engine development. But let it not be forgotten that over a period of seven years our own stockholders have subscribed over £22 million in cash and have permitted the retention of an almost equal amount in order to provide us with the development and manufacturing plant which we need. The high-altitude plant alone has so far cost £5.8 million."

Decca and the Government

IN the international struggle to decide on a common air navigation system it cannot be said that the British Government is failing in its efforts to promote the adoption of Decca and Dectra. The following statement, just issued by the Ministry of Transport and Civil Aviation, speaks for itself:—

"The Ministry of Transport and Civil Aviation has decided to arrange a series of demonstration flights in a Comet jet airliner to show observers from a number of different countries the advantages of adopting the well-tried Decca and Dectra systems as an international standard aid to air navigation. These demonstration flights will enable international observers to make their individual assessments of the two complementary systems prior to the Special Meeting of the International Civil Aviation Organization in February 1959 to select a future short-range navigational aid for aircraft—a meeting that has evoked wide interest.

"The demonstrations will show the following features of the Decca and Dectra system: (1) The ease with which airways flying, climb, descent and holding patterns can be flown accurately; (2) the precision and ease with which the pilot can report an aircraft's position; (3) the ability to see the actual course of the aircraft plainly marked by a pen on a moving chart under the eyes of the pilot in the cockpit; (4) the way in which the short-range (Decca) and long-range (Dectra) navigational aids are integrated to form a comprehensive system of air navigation using a unified airborne equipment; (5) greater simplicity of navigation on the North Atlantic route.

"Plans are in hand for a series of demonstration flights to be made in Europe in January 1959. In February it is intended to conduct further demonstrations from bases in North America. Invitations will shortly be issued to aeronautical administrations and airlines, inviting them to send observers to the demonstrations."

It is understood that the Comet which will be used is the Ministry of Supply's G-AOJU, a modified Series 1A.

Edgar Percival Finance

IN a reference to the withdrawal of the Finance Corporation for Industry from Edgar Percival Aircraft, Ltd., it was stated in last week's issue ("Prospects for the E.P.9," page 508) that the F.C.I. was the company's main shareholder. It is now learned that 80 per cent of the £25,000 Ordinary share capital is held by the founder, Mr. Edgar Percival, the F.C.I. holding the balance. While the Corporation has contributed £300,000 in long- and short-term loans, Mr. Percival's personal investment is well over £100,000.

In effect, the F.C.I.'s investment in Edgar Percival Aircraft will probably be taken over by Samlesbury Engineering, Ltd., of Blackpool. In view of this change the liquidation order has been withdrawn and the company has reverted to its previous status.

Ferranti Speed their Communications

FOLLOWING successful use of a de Havilland Dove as an executive aircraft since April 1954, Ferranti, Ltd., have replaced it with a twelve-seat D.H. Heron which, like the smaller aircraft, will be used to facilitate the movements of executives and technicians between the company's thirteen establishments located around Manchester, Edinburgh and London.

During its service the Dove put in about 700 flying hours annually, achieving a figure of about 200,000 passenger-miles per year and using over 70 airfields throughout the United Kingdom and Europe. The Heron (as was the Dove) is based at Turnhouse Airport, Edinburgh, and a central booking organization has been established in the Ferranti Edinburgh factory through which all requests for air transport are channelled. By this means an average load-factor of 75 per cent has been realized, resulting in a real measure of economy. It is the proud claim of the chief pilot, Captain W. Allan, that his passengers can expect to complete the London/Edinburgh journey about 45 minutes ahead of ordinary scheduled flights.

The Heron will be entirely maintained by the company's own ground crew. Two pilots and a radio navigator comprise the flying team. As may be supposed for a company so closely engaged in electronics and radar, the aircraft is generously equipped with modern flying aids, including multi-channel V.H.F. radio, Decca Navigator, I.L.S., and Ferranti artificial horizon.

P. and W. POWERED: The first Scottish Aviation Twin Pioneer to be powered with Prott and Whitney R-1340(S1H1-G) engines driving Hamilton Standard propellers. Five have been ordered for Philippine Airlines; descriptive notes appeared in "Flight" of July 4.

TEN YEARS OLD: On October 5, 1948, Westland flew their first helicopter, G-AKTW, a licence-built Sikorsky S-51. The pilot was Alan Bristow; the engine an Alvis Leonides. Rebuilt as the Widgeon seen in this recent "Flight" photograph, the same airframe is still going strong as a demonstrator.

FROM ALL QUARTERS...

Dutch/Belgian A.F. Merger?

IT is reported from Brussels that the Belgian and Dutch Air Forces are to merge on the basis of a recommendation by NATO. Operational training would be undertaken principally in Holland, and advanced pilot training would be at Kamina, in the Belgian Congo. Fouga jet trainers would be bought.

Scimitar Accident

COMMANDER of the first R.N. Scimitar Squadron (No. 803) and leader of the six-strong demonstration team which flew so brilliantly at Farnborough, Cdr. J. D. Russell, R.N., was drowned at sea on September 25 when his aircraft went over the side of H.M.S. *Victorious* after the first landing on the re-commissioned carrier. Seven other Scimitars of No. 803, which were to have landed-on, returned to R.N.A.S. Yeovilton, but embarked successfully later in the day.

According to eye-witness reports, Cdr. Russell's aircraft made a perfectly smooth touch-down after three dummy runs and its hook engaged an arrester wire. The wire, however, snapped and the Scimitar rolled slowly over the side of the carrier. The "plane-guard" Whirlwind lowered an aircrewman on a winch to within a few feet of the Scimitar's cockpit, the cover of which was seen to open; observers also noticed that Cdr. Russell had removed his helmet. At this point, say the reports, the cockpit cover was seen to close again. The Scimitar then sank.

The occurrence was seen on the evening of September 25 by viewers of B.B.C. and I.T.V. television news, whose cameramen —together with those of Gaumont-British and a photographic agency—were on board *Victorious* to record the arrival of the Scimitars. (*Newspaper coverage of the tragedy is the subject of a leading article on page 537.*)

R.Ae.S. Commonwealth Lecture

SUBJECT of the fourteenth British Commonwealth Lecture of the Royal Aeronautical Society—to be given next Thursday (October 9) by Mr. J. C. Floyd, vice-president engineering, Avro Aircraft, Ltd.—is *Some Aspects of Canadian All-weather Fighter Development*. It will deal mainly with the design, development and operation of the Avro Arrow, touching upon the history and philosophy behind the choice of a delta-wing configuration and going into some detail on its more unusual design features, the policy of manufacture and the integration of the airframe, engines, fire-control system and weapons into a weapons system.

Mr. Floyd, who was born in England and educated at Manchester College of Technology, joined A. V. Roe and Co., Ltd., in 1929 and served his apprenticeship there. He went to Canada in 1946 as chief technical officer of A. V. Roe Canada, Ltd.

After the lecture a dinner will be given by the R.Ae.S. at which the guests will include Marshal of the R.A.F. Sir Dermot Boyle, Chief of the Air Staff; Mr. A. F. Burke, president of the S.B.A.C.; Sir Cyril Musgrave, M.o.S. Permanent Secretary; Sir Roy Dobson, managing director of the Hawker Siddeley group and chairman of A. V. Roe Canada; Lord Douglas of Kirtleside, chairman of B.E.A.; Mr. G. J. H. Jeffs, L.A.P. commandant; and representatives of the Commonwealth High Commissioners and Commonwealth airlines.

AGRICULTURAL JACKAROO

DEMONSTRATED at Thruxton last week was the second of a batch of crop-spraying versions of the Jackaroo now being produced by Jackaroo Aircraft, Ltd. As illustrated in these *Flight* photographs, the crop-spraying Jackaroo is fitted with a spray tank in the cockpit and standard Allman under-wing spray booms, and can also use wing-tip atomizers as an alternative to the boom nozzles.

The unit mounted on the starboard wing-tip is the prototype of the Jackaroo D-W atomizer. In normal use one of these would be fitted to each of the lower wing-tips. Conversion from spray boom to atomizer delivery can be effected rapidly, as can conversion to four-seat passenger or light transport.

Basic price of the four-seater Jackaroo is £1,270. Spraytank, Allman booms and associated equipment add an extra £325, making the standard crop-spraying version £1,595. Additional optional equipment comprises: Jackaroo D-W atomizers, £86; Britten-Norman atomizers, £380; Palmer brakes, £50.

THE CROYDON CLOSURE

Users' Association Reveals Air Ministry's "Utterly Unacceptable" Terms for Move to Biggin Hill

THE controversy over the imminent closing of Croydon Airport—December 31 is the date fixed—reached a climax last Monday, when the Croydon Airport Users' Association issued a forthright statement concerning the terms under which they would be allowed to use Biggin Hill. The pronouncement, together with extracts from the Association's correspondence with the Ministeries concerned, is given almost in full below:—

Croydon Airport Users [says the statement] have recently been given the terms under which they would be permitted to occupy Biggin Hill after the intended closure of Croydon. As the majority of the aircraft at present using Croydon are not permitted to operate at Gatwick, and Biggin Hill is the only officially proposed alternative, this has precipitated a crisis in the fight being waged to safeguard the future of several firms, scores of light aircraft operators and over a thousand skilled workers. These terms, presented by the Air Ministry, are utterly and completely unacceptable and it is ridiculous to suppose that any business organization could or would make them work.

Perusal of the terms offered by the Air Ministry would appear to show that a sum of at least £25,000 a year would have to be found collectively by operators of Biggin Hill to pay for rent, rates, fire services, ambulance services and air traffic control (for example) before any thought could be entertained of receiving a return for their expenditure. Furthermore, the proffered security of tenure is completely inadequate.

These Air Ministry terms have placed the Minister of Transport and Civil Aviation in an extremely embarrassing position, because while he is under an obligation to wind up his Ministry's connection with Croydon (as he has stated publicly on many occasions) he is equally under an obligation by the terms of the Air Navigation Order to further the development of civil aviation; the closing down of businesses and disruption of club and private aircraft activity caused by a move to Biggin Hill, under terms which mean virtual financial disaster, cannot possibly be construed as furthering this cause.

Circumstances at Croydon have altered very considerably since the White Paper of 1953 and it is felt by all concerned that it would be a wise and generous move on the part of the Minister to reconsider his decision to close the airport.

The reasons for closing it which have been stated in public can, in fact, all be answered quite adequately:—

Noise: All the most noisy aircraft which have been using Croydon have now moved to Gatwick and many of those remaining have been fitted with silencers. Investigation of complaints proves that these come from a very small minority of local residents, all of whom moved into the area long after the establishment of the airport. Also, the modern trend is towards very much quieter engines in light aircraft.

Air Traffic Control: The fact that Croydon has been operating alongside Gatwick for some months proves that this is no problem; it is appreciated that the integration of Croydon into the new air traffic control plan will mean a slight revision, but the suggested alternative at Biggin Hill is not so far away geographically that this should make any difference.

Development: Further development of Croydon is not desired; it is entirely adequate for the purpose for which it will be needed.

Considering all these points, it is abundantly clear that the closure of Croydon at the end of the year as a civil airport offering Customs and other facilities in the London area will be a disaster which will be largely irremediable. Once dispersed, the Customs, control and safety organizations will be very difficult and financially almost prohibitive to replace. We therefore urge strongly upon the Minister of Transport and Civil Aviation that, in view of the fact that circumstances beyond his control have drastically altered the situation in the last few weeks, he give very serious consideration to the continued employment of Croydon as a civil airport, run either under his direct jurisdiction or of some other competent body, which will relieve him of a large part of the financial responsibility.

The following extracts from the letter to Croydon Airport Users, outlining the terms offered us, will indicate clearly the nature of the conditions. We have underlined the more important items in the extracts [these are printed in italics.—Ed., *Flight*].

The average rent of the 15 main buildings offered at Biggin Hill is £228 a year—there are two hangars at £3,500 a year each and five lesser buildings at an annual £75-£90.

EXTRACTS

Gentlemen, 28th August, 1958

I am directed by the Minister of Transport and Civil Aviation to advise you that, in accordance with the Government's policy as stated in 1953 in the White Paper on London's Airports and with Ministerial statements since then, Croydon is to close as a Ministry of Transport and Civil Aviation airport at the end of this year, the last day of operation being 31st December, 1958.

Subject to the results of consultation with the Kent County Council (as planning authority) which is now taking place, the Air Ministry are prepared to offer accommodation and flying rights at Biggin Hill to those civil users based at Croydon who need flying use of an airfield and who have not, so far, made other arrangements for themselves. The terms of the offer, *which represents the most favourable treatment that, after thorough study, Ministers are able to give*, are set out in the enclosed document.

I am to point out that the accommodation, particularly hangarage, available at Biggin Hill, is limited. Consequently, depending on the scale of demand from Croydon tenants, *it may be necessary to apportion space—and allocate between buildings—according to an assessment of priorities.*

BIGGIN HILL—TERMS OF OFFER

Scope. The Air Ministry are prepared to offer a limited amount of hangar and other accommodation available for letting at Biggin Hill, together with flying rights, under the terms and conditions described below. The offer is communicated by Ministry of Transport and Civil Aviation to those tenants from Croydon who require an aerodrome for flying south of the Thames and who have not been able to find acceptable accommodation elsewhere. These comprise remaining scheduled and charter operations, flying clubs, "executive" fleets of business firms, and commercial firms engaged in maintenance or development work on aeroplanes involving flying.

Accommodation. Hangar space, office accommodation and space in buildings for conversion into workshops will be offered to civil flying users from Croydon in the South Camp at Biggin Hill as direct tenants of the Air Ministry.

Period of Lease. This will be until 1st January, 1963. Tenants could have a break clause at 3 years if they wish, or could vacate at six months' notice at their option. Whilst the Air Ministry would be prepared to consider, in the light of circumstances existing at 1st January, 1963, an extension of the lease beyond that date, nevertheless *they reserve the right to determine the occupation at 1st January, 1963*, and to oppose the grant of a new lease by invoking Sections 57 and/or 58 of the Landlord and Tenant Act 1954.

Repairs. The tenant shall put, maintain and leave the premises in good tenantable repair.

Provision of Airfield Services and Airfield Maintenance. Tenants shall be permitted to use the adjoining airfield for flying by powered aircraft and shall comply with all regulations issued on behalf of the Secretary of State for Air and the Minister of Transport and Civil Aviation in respect of such user. *Tenants shall make such arrangements as may be necessary for the provision of airfield services*, as defined in Appendix A, to the satisfaction of the Secretary of State for Air and the Minister of Transport and Civil Aviation, *and shall bear the full cost thereof.* Tenants will maintain the airfield turf in good condition and will maintain the runways themselves, and the Secretary of State for Air accepts no liability for maintenance and/or repair. Tenants will be responsible for all annual outgoings on the airfield such as rates.

Outgoings. Throughout the tenancy, the tenant shall pay and discharge all rates, taxes, duties, charges, assessments and outgoings which are now or at any time may become payable in respect of the said premises and rights, landlords' property tax only excepted.

Statutes and Bye-laws. The tenant shall, at his own expense, carry out such works as may be required of the landlord or tenant under any Act of Parliament notwithstanding that such may not be enforceable against Crown property and to conform with the provisions of and regulations under any general or local Act of Parliament (including the Factories Acts) which may be applicable to the premises.

* * *

Appendix A: Proposed Air Traffic Control Arrangements for Civil Use of R.A.F. Station Biggin Hill:—

SCHEDULE, FOREIGN-GOING OR PASSENGER-CARRYING FLIGHTS, AND FLIGHTS INTO THE AIRWAYS: For flight in these categories, positioning from Gatwick will be necessary. Gatwick will be available for this purpose for aircraft equipped with suitable radio aids. These movements would therefore operate from Gatwick, with Biggin Hill available as a base for maintenance and housing of the aircraft. *No passenger carrying flights to or from Biggin Hill will be permitted.* Movements between Gatwick and Biggin Hill would be under height and route restrictions.

The civil commercial operators will be required to provide at their own expense such air traffic control at Biggin Hill as is necessary for their purposes and to satisfy M.T.C.A. safety standards under their own arrangements.

CLUB AND OTHER PRIVATE FLIGHTS: The clubs will need to produce a joint organization capable of maintaining discipline and orderly flying to the satisfaction of M.T.C.A. Circuit flying will be restricted to 1,500ft above mean sea level and take place in good weather conditions. Access to the aerodrome would be via free lanes to the North-east with a height limit of 1,500ft A.M.S.L. increasing to 2,500ft and to the west via Redhill, Dorking and Guildford at a height of 1,500ft A.M.S.L. throughout.

OTHER SERVICES: *Users will have to provide fire services, telecommunications and navigational aids* by arrangement among themselves, except that M.T.C.A. could lend ground equipment for VHF/RT and a single navigational aid such as manual VHF/RT.

Customs and Immigration would not be available, unless arranged on an "on call" basis.

HERE AND THERE

No Orbit

A VANGUARD satellite was fired from Cape Canaveral on September 26 but the final stage failed to go into orbit. The launching, seventh in the Vanguard series, was witnessed by Mr. Duncan Sandys.

Non-stop Triangles

A BOEING B-52 of U.S.A.F. Strategic Air Command, based at March A.F.B., has flown 6,214 miles without refuelling. The bomber flew twice around a triangular course of 3,107 statute miles at an average speed of 565 m.p.h. National Aeronautic Association observers were aboard.

Ubiquitous Storch

BOUGHT recently from a German baker by an ex-Dutch Air Force pilot who runs an air publicity service: the Fieseler Storch which was used to fly Mussolini from rough ground 10,000ft up in the Abruzzi Mountains, after he had been "liberated" by Otto Skorzeny. It is now being used for towing advertising banners.

"FLIGHT" NEXT WEEK

OUR annual special number devoted to business, touring and agricultural aircraft will appear next week, October 10. This enlarged issue will include an article describing in detail the extraordinary growth of executive aviation in the United States, while another will discuss the less happy position in this country. An illustrated review will also be given of relevant types of aircraft of all nationalities.

Exit the Wright Brothers?

IT is being claimed that the first flight ever made in New Zealand was in 1903 and not (as had been generally accepted) in 1911. The assertion has been made by the pioneer aviator and aircraft engineer Mr. George Bolt, who during a search for exhibits for the aviation section of Auckland Museum, "learned from Mr. Warne Pearse that his brother, Mr. Richard William Pearse, had built an aircraft in 1903 and twice taken off from a road near Temuka."

GAY BLADES: Hiller's new 12E commercial helicopter in an uncommercial attitude during "customer demonstrations" last month near the Palo Alto factory. Powered by a 305 h.p. Lycoming engine, this model is claimed to have 24 per cent more power than any helicopter of its class. Orders, say Hiller, have already necessitated stepped-up production.

Nine-hour Antarctic Flight

AN Il-12 with the Soviet Antarctic expedition recently made a nine-hour non-stop flight of 3,000 km (about 1,864 miles) over the Antarctic continent, according to the Soviet news agency Tass. The aircraft dropped supplies and equipment at two posts and made scientific observations, before returning to Mirmyon the Knox coast.

Illuminating Information

A SPECIAL "Lighting and Flash Guide" number of our associated journal *Amateur Photographer* is being published next Wednesday (October 8). It will contain illustrated descriptions of the whole range of necessary equipment, with articles on choice and operation. The price is 1s 3d as usual.

Flying Doctor Memorial

HONOURING the memory of the founder of the Royal Flying Doctor Service, the John Flynn Memorial Church has recently been completed at Alice Springs in Central Australia. Last year, the 30th in the Service's existence, its aircraft flew nearly half a million miles and its doctors treated 13,000 patients. In addition, 11,000 patients were treated after their complaints had been diagnosed over the organization's two-way radio network.

P.F.A. Changes

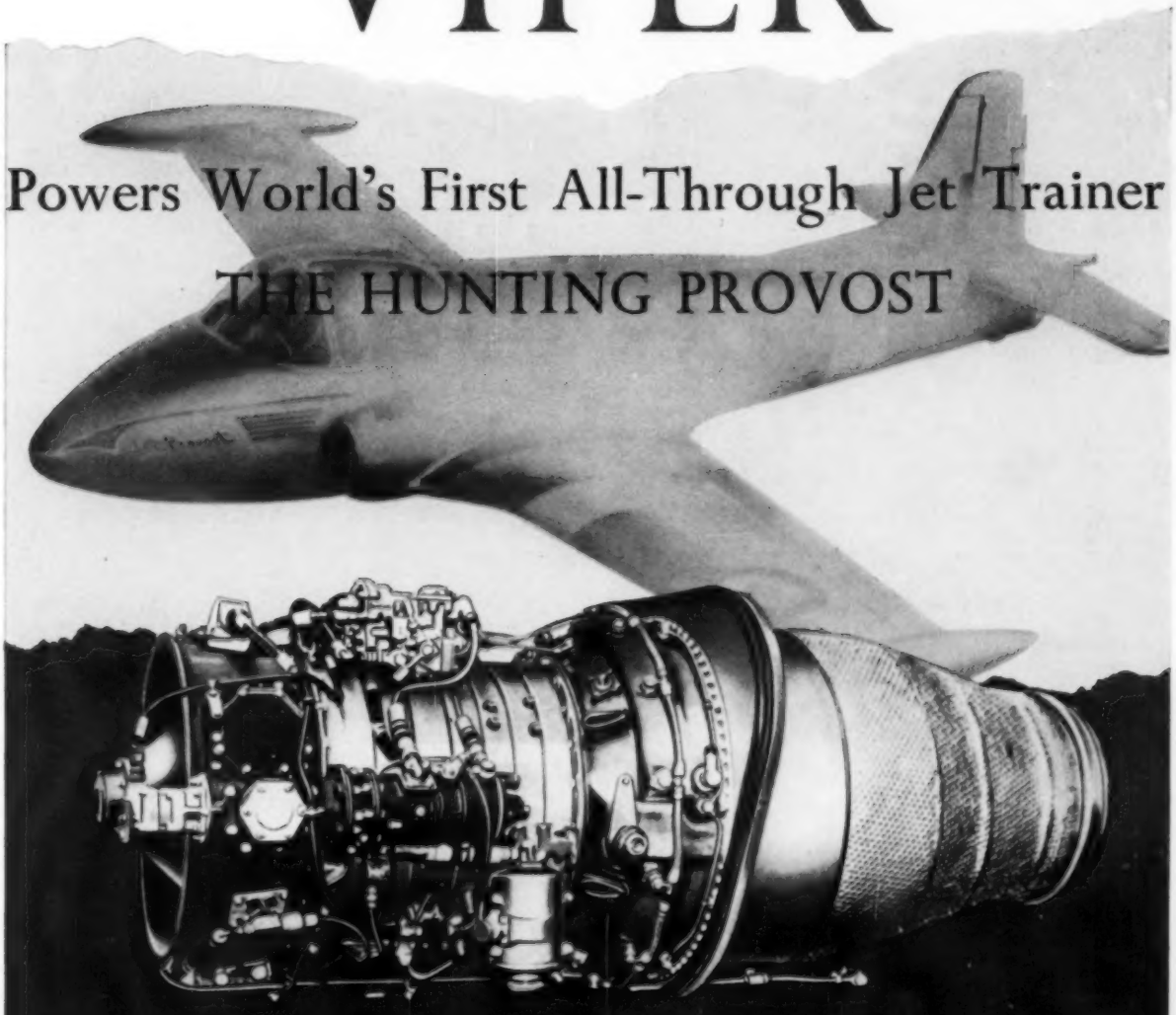
RECENT changes among the officers of the Popular Flying Association include the appointment of Mr. Harold Best-Devereux to succeed Lord Sempill as chairman of the executive committee, and that of Mr. Maurice Imray (previously hon. secretary) to succeed Col. R. L. Preston as hon. treasurer. The Association has now supplied over 200 members with constructional plans for ultra-light aircraft, and over 140 flying groups have been formed under its auspices.

DOVE AMBULANCE for the Northern Territory Medical Service, on the occasion of its handing over at de Havilland's Bankstown (New South Wales) factory. Left to right: The Australian Minister of Health, the Hon. Dr. D. A. Cameron; T.A.A. pilot Capt. J. Slade (who will be in command of the aircraft); and Mr. L. J. Brain, managing director of de Havilland Aircraft in Australia.

VIPER

Powers World's First All-Through Jet Trainer

THE HUNTING PROVOST



...Viper. Apart from the ... 'all-through' jet training for jet age pilots, economy was an ... Today, Jet Provosts, ... are serving with the R.A.F.; their ... training conditions has been beyond ...

Bristol Siddeley

ENGINES LIMITED

C

What do Desoutter do?

In response to an urgent appeal from the M.D. a careful survey, designed to discover the impact of 23 years' advertising, has recently been completed. In this nation-wide survey thousands of people were asked, "What do Desoutter make?"

2% said "Miniature Horses"
3% said "Hair Restorer"
0·5% said "Weak Jokes"
94·5% "Didn't Know"

The M.D. was most displeased. "I'm not suggesting," he said, "that our advertising hasn't done a quite subliminal job on their collective unconscious, but in one respect at least it may be said to have failed. Let us correct this now, gentlemen:

DESOUTTER BROS LIMITED

make Pneumatic
(i.e. driven by air)

and Electric
(i.e. driven by electricity)

Power Tools
(i.e. tools which for the purpose of this argument are driven by air or electricity)

Desoutter Brothers Limited, The Hyde, Hendon, London, N.W.9.

CRC 302

The Fare-differential Controversy

A BIG ISSUE FACING THE WORLD'S AIRLINES AT CANNES

SOUR GRAPES OR SWEET REASON?

ANY discussion on air fares inevitably centres upon two issues: the need to bring fares down, and the possibility that two kinds of air transport propulsion, jet and propeller, should be differently priced.

On the first of these issues there is universal agreement—though there are varying opinions as to the timing and extent of possible fare-reductions. On the second issue, that of the fare-differential, there is no agreement.

There are two distinct arguments for the fare-differential. Some airlines want one because they fear that their propeller fleets, piston or turboprop, will otherwise lose traffic to the more attractive jets. This is the short-term, "sour-grapes" argument for the differential, and it is a vulnerable one, as will be discussed in a moment. Then there is the long-term argument, which is simply this: a fare differential is the means by which the air transport industry can relax its obligatory obsession with "quality-competition." Before enlarging upon this it is appropriate to examine the separate short-term argument.

It is really this which has aroused the controversy. Why, the jet airlines demand, should we be obliged to charge higher prices for jets—in which we have invested so much—just to protect the interests of the slow coaches? Why indeed? There can be no economic or moral justification for pricing a better quality product out of the market, *unless it can be conclusively shown to be more costly to produce*. And, of course, it cannot be proved that DC-8s, 707s, Comet 4s and Caravelles will be more costly to operate than Britannias, Vanguards, Electras and Viscounts. Any argument about comparable costs is, for the moment, pure sophistry.

Some airlines shrilly demand a jet-surcharge. Others discreetly seek a propeller-discount; and in support of their case they argue as follows: "We do not say that our turboprop or piston airliners are cheaper to operate than jets—though we strongly believe that they will be on the shorter sectors. But we are prepared to have a go at operating them at lower fares, on the economic principle that it is better to operate useful airliners on a marginal basis than to operate them empty, put the steam-roller over them, or sell them at a loss." Here is the germ of a reasonable argument, and it brings us to the point at which the long-term implications of a differential can be considered.

There is now sufficient evidence to support the view that the airlines are heading for a severe financial crisis. The I.C.A.O. air transport committee's study and the report on the U.S. airlines prepared by Professor Cherington both highlighted the fundamental fact that the airlines have financially over-reached themselves in their orders for new equipment.

No repetition of the nature of this crisis is called for here, since it has been discussed ad nauseam. But the cause of the crisis needs to be restated, in order to show that the fare-differential is, *in the long term*, the means by which similar future crises can be avoided. The airlines, being unable to compete on price, can compete only in quality. This has stimulated a demand for higher performance, and has created conditions in which aeronautical technology becomes preoccupied more with improved performance than with improved cost. And such is the pace of technological progress that, in order to protect their competitive position, the airlines have been obliged to buy each new technical advance before existing equipment has paid for itself. In other words they have been squeezed between heavy re-equipment costs on the one hand and unnecessarily high depreciation charges on the other; and this has happened while all other costs have risen and while traffic growth-rate has not produced the anticipated load factors.

No one suggests that technological progress, and the better standard of service which it produces, should be stopped—only that it should be slowed down. If the pace of re-equipment is not checked the airlines will be squeezed more and more tightly between heavy depreciation costs and the financing of new technical advances such as area rule, turbofan conversion-kits, super-circulation, etc., etc.—and eventually supersonics. And still they may find it difficult to penetrate into the mass market on which depends the future of the air transport industry, and the manufacturing industry which supplies it.

This is the long-term argument, the *real* argument, for the fare-differential. Once a differential were established it would keep "quality competition" in check, and would encourage technology to be devoted more to the production of cheap transport aircraft, uncompromised by performance. You do not have to fly at 600 m.p.h., or even 300 m.p.h., to attract custom from rail, road and sea.

J. M. R.

DIFFERENTIALS: A LAYMAN'S GUIDE

WHEN experts disagree as violently as in the debate for and against fare differentials, onlookers are quite entitled to feel confused. *Flight* has for eighteen months consistently advocated lower fares on slower services. While continuing to favour such a differential, one must readily admit that any argument must depend on a number of uncertain assumptions.

The most basic assumption is the meaning given to the term fare-differential. Specifically, it means that for a given class of traffic, the fare will be less on slower than on faster services. This does not mean that piston and turboprop aircraft must continue to operate at present fares while turbojets are "penalized" by higher fares. Nor does it mean that turbojets will be restricted to higher fares while the mass market will be reserved for slower aircraft. Many of the arguments against fare-differentials have in fact been founded on these last two unrealistic definitions.

Forcible limitation of turbojets to the first-class market has, as far as we know, been seriously proposed by no one. However, there are a few airlines which believe that, class-for-class, jets can and should command higher fares. This has been attacked as an effort to price the jets out of the market, but countered on the grounds that it would be folly to charge the public less than they are prepared to pay for jet travel.

Those supporting a fare-differential suppose that jets are going to offer an unprecedented standard of service. Higher speeds, low internal noise, lack of vibration, smoother flight, and novelty: all these should combine to render jets highly attractive. But some operators are unsure whether this is the whole picture. In the early stages A.T.C. problems might prohibit higher block speeds on short-haul jet services. Furthermore, memories might be such that the public could be unwilling to accept jets until their safety has been proved. If these contentions were in fact valid, then a higher fare on jet services would indeed be unwarranted.

Even if it is assumed that jets will offer more attractive travel, nobody knows whether the public will be prepared to pay more for it than for slower services. If the current recession were to continue, then the travelling public, having less money to spend, might well put savings first. But the latest evidence suggests that many will gladly pay higher fares for jet travel.

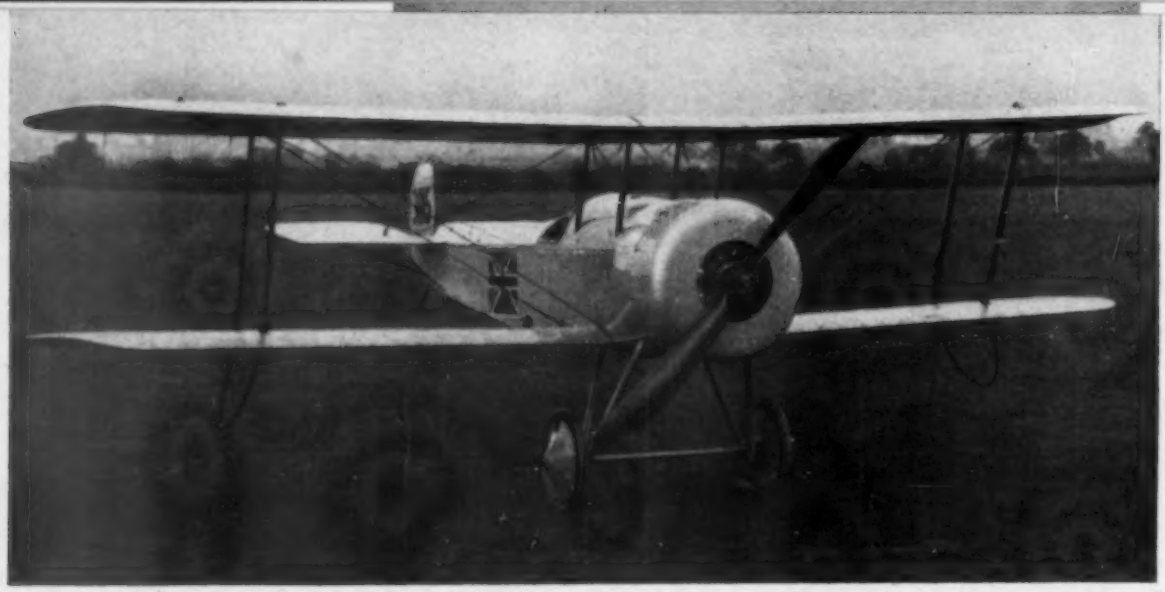
This business of selling seats is closely tied to the problem of capacity, for the airlines realize the necessity of filling rather more than half the available space if they are to break-even. All the latest studies into the effect of jet re-equipment have reached the same conclusion: airlines will be faced with over-capacity unless they develop new markets, put existing front-line equipment on to lesser routes, or sell their existing fleets to other carriers.

Although all the long-haul jets at present on order will represent only about one-third of total world capacity by the early 'sixties, on most of the world's major trunk routes they will be able to satisfy all traffic requirements assuming a continuing growth rate of about 15 per cent. As very few of the first-generation jets will be suitable for the less important routes, there will not be room for turbojets, turboprops and pistons on the trunk-routes unless traffic increases at a remarkably fast rate. If differential fares resulted not in rapid traffic growth but in diversion of passengers from expensive, fast services to cheap, slow services, then an opposition to differential fares is understandable. Sir William Hildred, I.A.T.A.'s director-general, was recently heard to liken the potential demand for air transport to the waters of a reservoir: lower the height of the dam by only a few inches, he said, and millions of gallons will flood over the top. If this is a true analogy, then there is a strong case for introducing—through the differential—a level of fares so low that the mass market can really be tapped.

It is possible that the level of fares needed to effect this penetration is so low that even obsolescent aircraft are unable to operate economically. But in the short-term, it is only possible to judge whether a given low-fare operation is economical or not when it is compared with the cost of selling existing front-line equipment or operating them on less suitable routes. This comparison is more important in the short-term than the relative operating costs of these aircraft compared with jets.

In the long-term a fare-differential would only be justified if the slower aircraft were truly cheaper to operate. Not until 1960 will it be possible for anybody to declare honestly whether turbojets are the cheapest vehicles in practice. But the fact remains that virtually all objective studies to date suggest that the large, slow turboprop—a type which no manufacturer has yet dared produce—should be able to offer cheaper air travel than any other design yet conceived.

J. C. S.



Scout C No. 3015, R.N.A.S. Comparison with the Scout B (heading, Pt. 1) shows deeper top decking ahead of cockpit, and modified cowling.

THE BRISTOL SCOUT

HISTORIC MILITARY AIRCRAFT No. 18 PART II By J. M. BRUCE, M.A.

IN the spring of 1916 Bristols were still scarce and were carefully husbanded by the R.F.C. R. H. Kiernan has recorded that, by April 1916, Albert Ball ". . . never missed a day without asking his C.O. to let him fly 13's Bristol." At the end of that month, Ball went to St. Omer to learn to fly single-seaters, and on his return he was allowed to fly No. 13's Bristol. On May 5 he set off in a new Scout which, according to Kiernan, "had been faultily synchronised, and when he tried his gun as he crossed the lines the shots almost cut his propeller in two."

One wonders whether this was the aircraft mentioned by Maurice Baring in *Flying Corps H.Q., 1914-1918*. Of it, against May 17, 1916, he noted ". . . the lamentable case of a Bristol that was sent to No. 13 Squadron and put every bullet into its propeller with the Vickers gun, it not having been fired at the Depot." The Scout concerned must have been one of the few to be fitted with a Vickers gun and interrupter gear. Some details of that development and of other forms of armament fitted to the Bristol Scout will be discussed later in this history.

Ball had few combats on the Bristol, because he was transferred to No. 11 Sqn. on May 7 and given a Nieuport Scout. On May 16, however, he was again flying a Bristol Scout at 12,000ft over Givenchy when he saw a German two-seater 7,000ft below him. He dived and fired at the enemy at a range of about 650 yd. The long dive had fouled his engine, however, and he was unable to press home his attack.

Six weeks later, when the Battle of the Somme opened, there were only six operational Bristol Scouts with units of the R.F.C. in France. Three were with No. 11 Sqn.; the others had been attached to No. 24 Sqn. from squadrons of the Third (Corps) Wing, which at that time consisted of Nos. 3, 4, 9 and 15 Sqns. A success was scored by one of No. 24 Squadron's Bristols on July 10, 1916, when 2nd Lt. P. B. Prothero shot down an enemy aeroplane, which was seen to crash.

The Bristol Scout was not heard of in operational R.F.C. units in France after the Battle of the Somme, yet forty-five were sent there in 1916, more than in any other year: the total for 1915 was 27. A further six went to the Expeditionary Force in 1917, but their destinations are unknown. Some at least would be used at Aircraft Depots to provide sorely needed flying practice for pilots awaiting posting to scout squadrons; others were probably appropriated by senior officers for use as personal aircraft; the remainder would doubtless be stored.

It has been noted above that the Bristol Scout was built for the Admiralty as well as the War Office. Deliveries to the R.N.A.S. began in 1915. Some confusion over the commencement of the Scout's service with the R.N.A.S. has been caused by erroneous references to its use, late in 1914, by No. 1 Sqn., R.N.A.S. The references in question could only have arisen from the incorrect identification of the "80 h.p. Bristol biplanes" which were with Naval One at the time. These were in fact Bristol T.B.8 two-seaters.

It seems probable that No. 2 Wing at Eastchurch was one of the first R.N.A.S. units to receive Bristol Scouts. It is known that the Scouts numbered 1245, 1249, 1254, and 1255 were at Eastchurch in July 1915.

The R.N.A.S. used Bristol Scouts from a number of aerodromes in the U.K., Great Yarmouth among them. In January 1915, however, the equipment of the R.N.A.S. station there consisted only of an assortment of Sopwith Spinning Jenny two-seaters, Sopwith 807 seaplanes, Farman biplanes, and various Shorts. Three aircraft were at readiness on January 19, 1915, but neither they nor any other then at Yarmouth could have closed with the Zeppelin L.3 which bombed the town at about 8.25 p.m. that evening. As it was, none of the three aeroplanes attacked either the L.3 or the L.4 which passed over Yarmouth just after midnight, homeward-bound after bombing Hunstanton and King's Lynn. The bombs of the two airships killed a total of four people and injured thirteen; between £7,000 and £8,000 worth of damage was caused.

Those were the first German airship attacks on this country; they were made only ten days after the Kaiser had agreed, with seeming reluctance, to the mounting of airship raids on targets in Britain. He stipulated that targets were to be "expressly restricted to military shipyards, arsenals, docks, and, in general, military establishments, and that London itself was not to be bombed."

At that time, the aircraft flown as part of the air defence of Great Britain belonged to the R.N.A.S. One need hardly add that they were neither numerous nor adequate. More Zeppelin raids were made in April and May 1915. On May 17, the L.Z.38 was unsuccessfully pursued by Flt. Sub-Lt. R. H. Mulock in an Avro 504 from Westgate; and the L.Z.39 was damaged by bombs dropped on her by Flt. Cdr. A. W. Bigsworth, flying one of the Avros of the R.N.A.S. unit at Dunkerque. That Zeppelins could be killed by aeroplanes was proved on June 7, when Flt. Sub-Lt. R. A. J. Warneford successfully bombed the L.Z.37 to destruction over Bruges.

In view of the small margin of superiority in performance that Warneford's Morane-Saulnier Type L possessed over the airship, his achievement was an outstanding one. His and all other experiences with Zeppelins up to that time proved that only fast scouts with a high rate of climb were likely to prove satisfactory counter-weapons. On the day before Warneford's spectacular success, the Admiralty had ordered another batch of fifty Bristol Scouts, to be numbered 3013-3062.

The R.N.A.S. used its Bristols in a variety of ways. At home stations they were regarded as anti-Zeppelin aircraft, and several were on the strength of such units as Eastchurch, Port Victoria, Great Yarmouth, Redcar and Chingford. Great Yarmouth had a few Bristols among the 27 aircraft which were on its strength on August 4, 1915; at the end of 1915, four of the station's 31 aircraft were Bristols.

That an aeroplane could take off from the deck of a ship under way had been demonstrated by American and British pilots before the war. The first such take-off in time of war was that made on August 6, 1915, by Flt. Lt. W. L. Welsh, who flew a Sopwith Schneider seaplane off the 120ft flight deck of H.M.S. *Campania*: a wheeled dolly was placed under the floats to facilitate the take-off. (An earlier, makeshift, attempt was made to fly a Schneider from the forward platform of H.M.S. *Ben-my-Chree* on May 11, 1915, but was unsuccessful—see *Flight*, November 15, 1957, p. 765.)

[*Contd. on p. 545*

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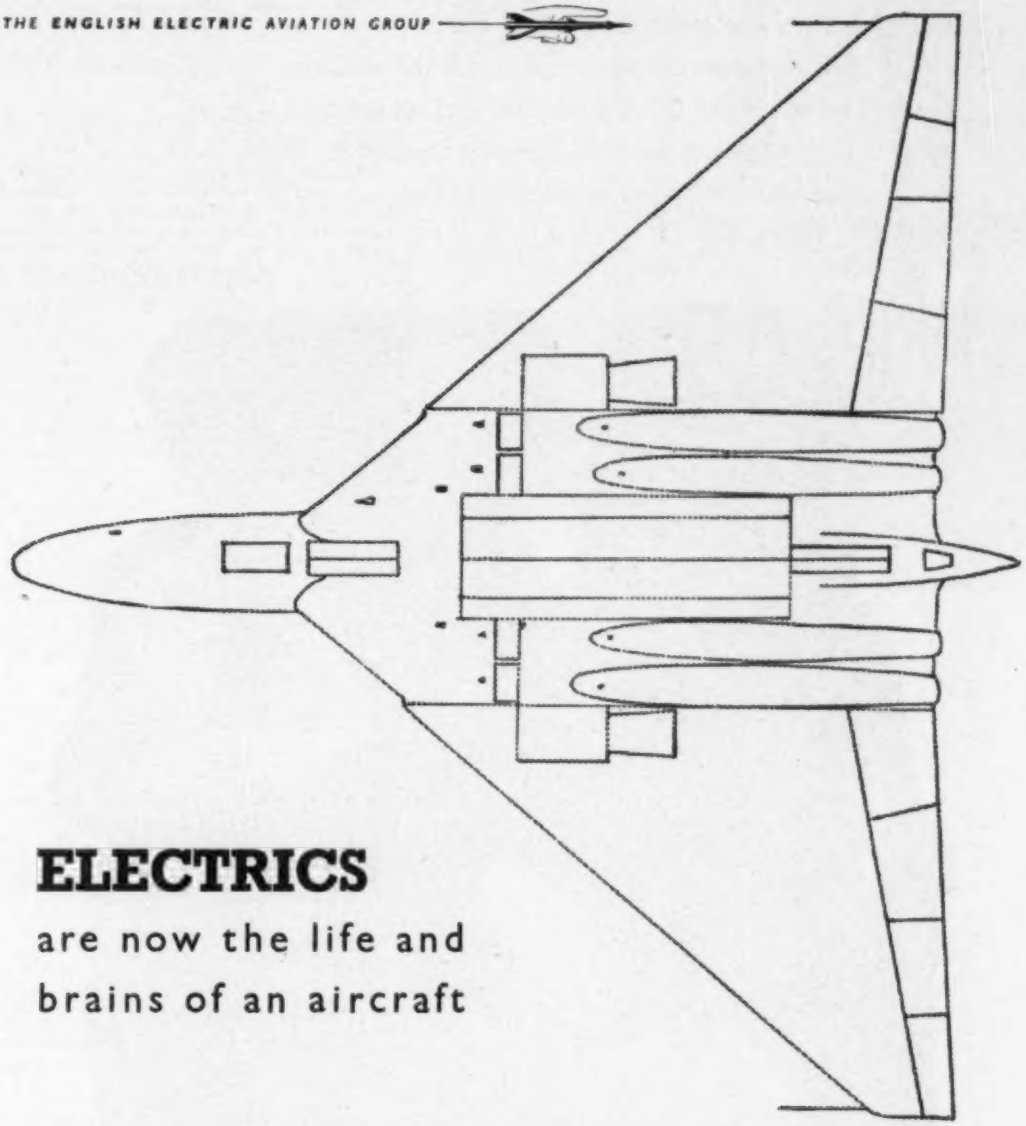

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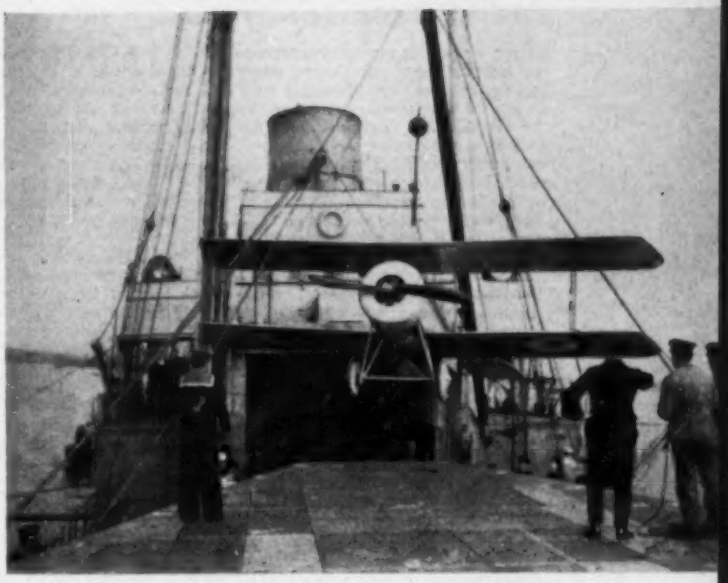

Scout C No. 1255, first landplane to be deck-launched, being hoisted on to the flying deck of H.M.S. "Vindex."

THE BRISTOL SCOUT . . .

The first British landplane to fly from the deck of a carrier vessel was the Bristol Scout No. 1255. In the hands of Flt. Lt. H. F. Towler, it took off from the flying deck of H.M.S. *Vindex* on November 3, 1915. This vessel, of 2,900 tons and capable of 22 kt, was the modified and renamed Isle of Man passenger steamer *Viking;* she was commissioned in September 1915. *Vindex* could accommodate one small and four large seaplanes aft, and two single-seat landplane scouts forward. A flying-off deck and hangar were provided for the scouts, but space was so limited that they had to be carried dismantled in the hangar. H.M.S. *Vindex* was the first of the smaller aircraft carriers to be fitted with a flying deck.

The only visible modification to the Bristol Scout was the addition of slinging gear above the centre section. This was necessary not only for possible retrieval of the aircraft, but also because the hangar on *Vindex* was at a lower level than the flying deck, and the Scouts had to be hoisted up to the deck by one of the ship's derricks. The Scout which Towler flew on November 3 had been one of the first to be delivered, some six months earlier, to No. 2 Wing, R.N.A.S., Eastchurch.

The proven ability of the Bristol Scout to take off from a carrier vessel at sea immediately increased its potential efficacy as an anti-Zeppelin aircraft. That capability was not put to the test until August 2, 1916, however. After Jutland it was obvious that the German fleet would be unable to put to sea again for some time. It was therefore expected that naval Zeppelins, having reduced fleet-reconnaissance commitments, would resume their attacks on British cities. H.M.S. *Vindex* was ordered on July 29 to be ready to put to sea at one hour's notice during the hours of darkness, so that her aircraft might have an opportunity of attacking raiding airships.

When news was received that an attack was expected on August 2, *Vindex* put out from Harwich. A Zeppelin was sighted, and just before 7 p.m. Flt. Lt. C. T. Freeman took off from *Vindex* in a Bristol Scout. Whilst seeking his quarry, he saw two other Zeppelins, one ten miles and the other twenty miles away. He flew towards the nearer, succeeded in getting into position 500ft above the airship, and emptied a container of Ranken darts on to it. The darts missed. Freeman again attacked, dropping half a container of darts, which were successfully avoided by the Zeppelin. Although under fire from a machine-gun on top of the airship, Freeman made a third attack with his remaining Ranken darts. At least one of the missiles struck the Zeppelin, which emitted a puff of smoke, dropped 3,000ft, but failed to catch fire. It made off eastwards, and Freeman set course for *Vindex*.

The Bristol's engine refused to pick up, and Freeman was obliged to come down on the sea near the North Hinder light-vessel. His Scout was fitted with air-bags, which kept it afloat, but the weight of the engine gradually pulled the nose down, and Freeman was fortunate to be rescued by a Belgian ship. It is believed that he was flying a Scout D, the development of which will be discussed later, and that his enforced descent was caused by loss of fuel.

The Ranken dart was briefly described in Part IV of the history of the Sopwith Tabloid, Schneider and Baby (*Flight*, November 29, 1957, p. 845). The darts were stowed in canisters which held 24 and could be released three at a time. Those R.N.A.S. Bristol Scouts which were armed with Ranken darts had two canisters mounted directly under the pilot's seat.

Freeman's experience did nothing to promote confidence in the effectiveness of the Ranken dart as an anti-airship weapon. The immediate consequence of his action was that all the aircraft carried by H.M.S. *Vindex* were forthwith fitted with machine-guns. Of greater significance, however, was Freeman's proof of the potential usefulness of the carrier-borne aeroplane as an anti-Zeppelin weapon. It would not be too much to say that his abortive combat sealed the fates of the Zeppelins L.23 and L.53, shot down on August 21, 1917, and August 11, 1918, respectively, by aeroplanes which took off from seaborne platforms.

Some months before Freeman's combat, one of *Vindex*'s Bristol Scouts C (No. 3028) had participated in a remarkable R.N.A.S. experiment which aimed at providing an effective means of combating enemy airships. As described in the history of the Felixstowe flying-boats (*Flight*, December 2, 1955, p. 845) the Bristol was mounted above the upper wing of a Porte Baby flying-boat. Its wheels rested in crutches attached to the Porte's central engine; its tailskid was held by a quick-release catch operated by its own pilot. Superficially the combination resembled the Short-Mayo Composite Aircraft of twenty years later. It was totally different in principle, however, for the Scout's rôle was purely passive: it was carried into the air with engine off by the flying-boat, contributing no power and probably little lift to the combination. With Flt. Lt. M. J. Day at the controls of the Scout and Sqn. Cdr. Porte himself flying the Baby, a successful separation was made at 1,000ft over Felixstowe.

It is not known why the experiment was never repeated. Possibly the weight of the Scout deprived the flying-boat of so much fuel that it would not have a worthwhile range and would therefore be unable to transport its Scout to areas where Zeppelins would be most likely to be found.

British output of aeroplanes increased steadily throughout 1915: total production from August 1914 to June 30, 1915, amounted to 902 aircraft; in the next three months 692 were built, and in the final quarter of 1915 output totalled 948. Production of engines increased in similar fashion, but was beset with difficulties. Britain was making Gnôme engines, both the 80 h.p. and the 100 h.p. Monosoupape, in 1914, but looked to France for certain supplies, notably aircraft and engines. In June 1915, France threatened to stop these supplies because Britain had failed to maintain her deliveries to France of 15 per cent of the total British output of Lewis guns. Fortunately the British government was able to give an adequate reassurance to our ally, and deliveries of the 108 complete aeroplanes and 176 engines then outstanding from British orders placed in France were not delayed.

Deliveries of the 80 h.p. Le Rhône engine did not commence until the early summer of 1915. By the end of June that year, 23 had been delivered, but only 30 more arrived during the next three months. The 80 h.p. Gnôme powered a number of the early British aircraft, but by the end of June 1915 output of that

(Left) Scout C with fairing in front of cockpit, seen at Isle of Grain. The fairing might have housed a machine-gun. (Right) Scout C. No. 3028 mounted on upper wing of Porte Baby flying boat. A successful separation was achieved.

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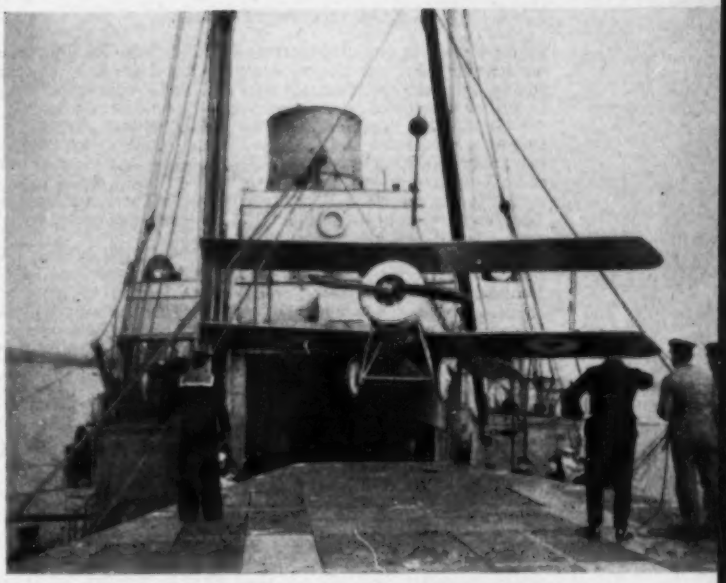

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engine by British manufacturers totalled only 108. Production of the Bristol Scout was slowed down by the shortage of engines, and the necessary modifications were designed to enable the 80 h.p. Le Rhône to be fitted as an alternative to the Gnôme. At that time, the Gnôme was regarded as slightly more reliable than the Le Rhône; consequently the available Gnôme engines were fitted to the Scouts supplied to the R.N.A.S., because the aircraft were liable to have to fly over the sea, and the Le Rhônes were installed in the Scouts for the R.F.C. Later, however, both Services had Scouts with both types of engine. A few machines had a further alternative, the 80 h.p. Clerget.

The oil pump of the Le Rhône was somewhat less efficient than that of the Gnôme, and it was found that the engines of the Le Rhône-powered Bristol Scouts were starved of oil when climbing. Part of the trouble lay in the loss of head caused by the rearward position of the oil tank behind the cockpit, and a remedy was effected by moving the tank to a new position in front of the cockpit.

Not all of the members of the R.N.A.S. would have agreed with the official opinion of the 80 h.p. Gnôme's relatively greater reliability in the Bristol Scout, however. The text of *The Story of a North Sea Air Station* includes some fascinating notes on the aero-engines in use at Great Yarmouth in 1916, contributed by the station's engineer officer. He wrote:

"We had a number of 70 h.p. (*sic*) Gnôme engines fitted into Bristol Bullet single-seater biplanes. These machines invariably crashed owing to the petrol supply pipe to the carburettor breaking off, as the result of faulty method of fixing the drip trays which were arranged to catch any overflow of petrol and conducted it outside the fuselage. The engines themselves were quite a good job if well looked after. Valves gave a fair amount of trouble and the scraper rings fitted to the piston heads had to be carefully watched."

That his adverb "invariably" was something of an exaggeration was proved on April 25, 1916, when, at 4 a.m., Flight Lieutenants Chichester Smith, B. D. Kilner, and C. E. Wood all took off in Bristol Scouts to attack a Zeppelin which was apparently co-operating with the German naval force bombarding Lowestoft and Great Yarmouth. The airship climbed into the clouds and escaped; the Bristols returned to Great Yarmouth.

Production Bristol Scouts which had the revised oil system were designated Scout D, but it seems possible that many existing Scouts C had their oil tanks moved forward at some time during their existence. More noticeable distinguishing features of the true Scout D were its shorter ailerons, increased dihedral (3 deg instead of the original 1 deg 45 min), and the outboard position of the wing-tip skids. The lower mainplanes were also modified to provide an aperture about four inches wide at each root abaft the front spar; these gaps improved the pilot's downward vision to some extent.

The first Scouts D were the batch of thirty, 7028-7057, which were ordered for the R.F.C. on October 18, 1915, under Contract No. 87/A/185. They were closely followed by fifty more, 8951-9000, ordered on November 9, 1915, under Contract No. C.P.146161/15/x for the R.N.A.S. The Scouts built under these two contracts had different power units: those for the R.F.C. had the 80 h.p. Le Rhône, whilst the R.N.A.S. machines were built to take the 100 h.p. Gnôme Monosoupape. A new cowling of larger diameter was designed for the Monosoupape: on the starboard side it had a peculiar bulge which was incorporated to assist the escape of exhaust gases from the cowling.

It is not certain that all the R.N.A.S. Scouts D of that first batch were fitted with the Monosoupape engine; and the fact that a Scout had the bulged cowling was not an infallible indication that the power unit was a Mono-Gnôme. It is known that fourteen Scouts D of the Admiralty order were diverted to the War Office. These aircraft were 8981-8993 and 9000, and they were delivered to the War Office without engines. All were later returned to the Admiralty (8988 was flown at the R.N.A.S. aerodrome at Chingford), but it is not known what type or types of engine were then fitted to them.

The R.F.C. contract was extended by a further fifty Scouts D, numbered A.1742-A.1791 and powered by the 80 h.p. Le Rhône. Six were transferred to the Admiralty: these were A.1769-A.1772 and A.1790-A.1791. The Admiralty placed a further contract on November 1, 1916, this time for thirty Scouts D numbered N.5390-N.5419. Only the first ten machines had the 100 h.p. Monosoupape engine, however, for that power unit had been found to vibrate and consequently to cause leakage from the fuel tank. The remainder of the batch were fitted with the 80 h.p. Gnôme.

The first Scouts D to be allocated to H.M.S. *Vindex* were 8953-8955, and it was probably one of those three which was flown by Flt. Lt C. T. Freeman on August 2, 1916, when, as already described, he attacked a Zeppelin. His forced descent after the combat has been ascribed to leakage of fuel caused by the vibration of his Scout's Monosoupape.

The batch N.5390-N.5419 were the last Bristol Scouts to be built, and were characterized by a V-shaped notch in the trailing edge of the centre section: this was made to facilitate the use of a Lewis gun mounted on the centre section. In March 1917 the British and Colonial Aeroplane Co. were invited to tender for a further batch of forty Scouts D, but the firm declined to do so. The serial numbers which had been allotted (N.6610-N.6649) were re-allocated.

(To be continued)

LEONIDES-HUSKY PROGRESS

AMONG the Vancouver-based bush aircraft which were used to good effect during the recent forest-fire emergency in British Columbia (*Flight*, August 22) was the prototype Leonides-powered version of the Fairchild F-11 Husky. Fitted with a special 150-gal water tank in the cabin, the Leonides-Husky logged 85 hours in 15 days on water-dropping and other work for the B.C. Forest Service in the Nelson district.

Husky Aircraft, Ltd., was formed just over three years ago, with the aim of creating an aircraft manufacturing facility on Canada's West Coast and of putting the Leonides-Husky into production. At that time the Husky powered by the Pratt and Whitney Wasp Junior had been in service for nine years and had proved a robust and economical aircraft, but was thought to be underpowered, hence the decision to replace the Wasp Junior by the 550 h.p. Alvis Leonides 503/8 engine driving an 11ft diameter, three-bladed de Havilland propeller.

During the test, development and proving programme of the new Husky the enhanced performance of the machine originally envisaged has been conclusively confirmed. The only major modification has been the introduction of revised engine cowlings and baffles to give improved cooling of the upper cylinders during the later stages of a sustained climb at full gross weight and maximum power. The formal reports covering the full test programme have now been completed and are being submitted to the Canadian Department of Transport. Certification trials for the issue of Type Certificate and C. of A. will follow.

"Flight" photograph

The Leonides-Husky in company with a Beech 18 at Vancouver.

Special clearance for the use of the Leonides-Husky on forestry work was given by D.o.T. during the extremely serious fire emergency in British Columbia during July and August. In eight days a special tank was designed, built and installed in the aircraft cabin, with inlet pipes between the floats (enabling the tank to be refilled in six seconds of fast taxying) and a dump chute leading to the open rear belly loading door. During 15 days' operation in the Nelson district, the aircraft was operated continuously at full gross weight at climb and maximum-cruise power, except for the low-level water-dropping runs. Engine and aircraft performed without fault during the 85 hours' flying, and oil consumption proved to be the precise Alvis company figure of four pints per hour.

One year ago an independent project appraisal and market survey confirmed that production of the Leonides-Husky was economically feasible and that a market for the machine does exist. The delay in reaching the production phase has been due largely to fluctuating economic conditions which have affected the efforts of the company's directors to find the necessary capital. Prospects now appear promising for financing the production phase in the near future.

President of Husky Aircraft and principal investor in the project to date is Mr. B. O. Brynelsen. Mr. A. M. Mackenzie, formerly chief test pilot and sales manager of Fairchild Aircraft, Ltd., at Longueil, Montreal, when the F-11 was originally built, is managing director and has been in charge of all test and development of the Leonides-Husky. Manager at the company's premises at Vancouver Airport, where general repair and overhaul of light aircraft is carried out, is Mr. L. J. Anderson.

ROLLS-ROYCE DEVELOPMENTS

Jet Engine Noise Suppression

Rolls-Royce have been actively developing jet noise suppressing devices since 1950, and have accumulated a wealth of experience in the development and production of aircraft carried noise suppression systems.

Corrugated nozzles developed by Rolls-Royce, which are in production for use on the Avon engines of the de Havilland Comet 4, achieve a reduction of five decibels in the noise level of this aircraft with a penalty of less than one per cent in overall performance, and have accumulated more than seven thousand hours in flight in Comets alone. With these nozzles fitted, the Comet 4 is quieter in operation than contemporary large piston engined aircraft.

Rolls-Royce are also developing noise suppressing nozzles for the Boeing 707-420, powered by four Rolls-Royce Conway by-pass turbo jets.

—another technical advance in

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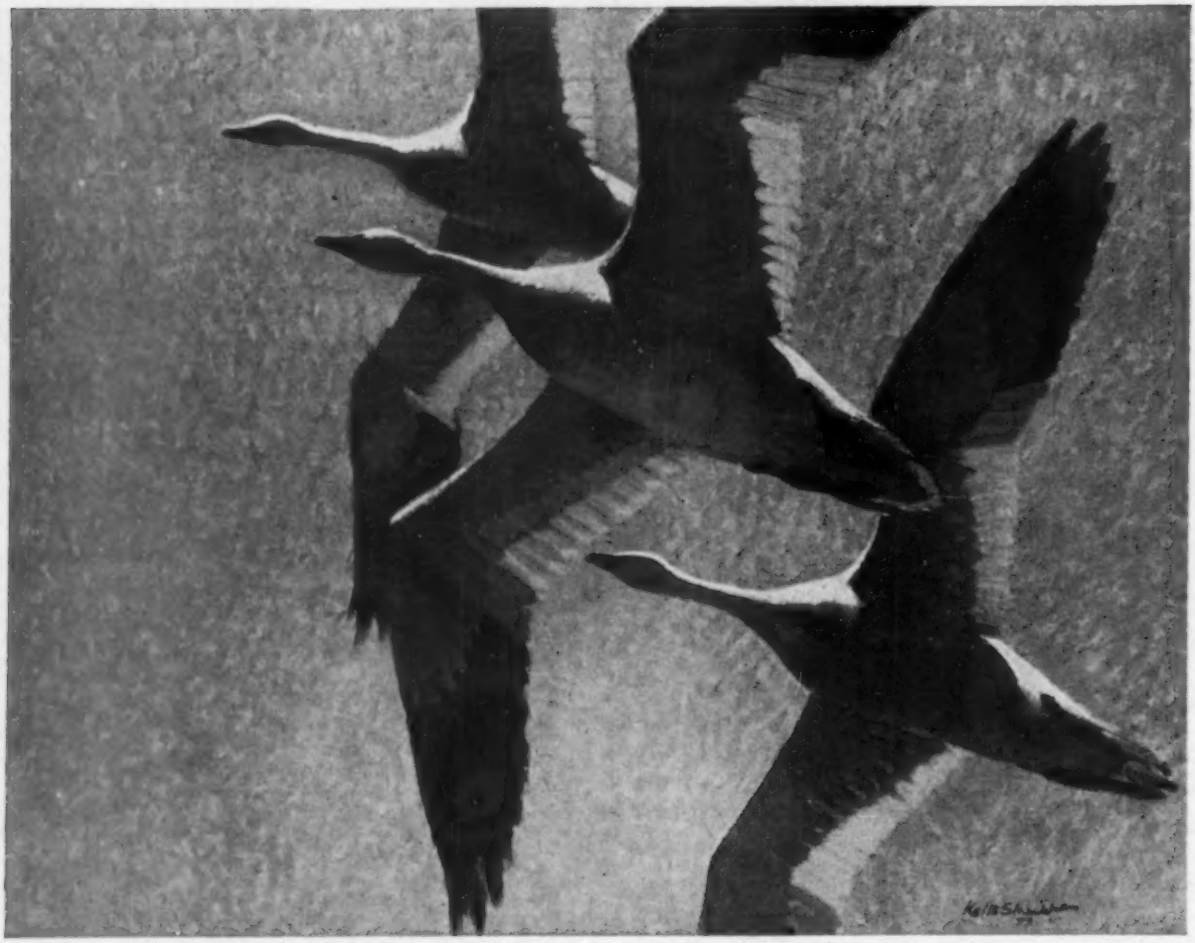

No. 1 in a series of paintings by Keith Shackleton S.Av.A. presented by Cellon Limited

Snow Geese against the Sun

The Snow Goose is a native of North Eastern Arctic Canada migrating southward in the winter to the Gulf coast and southern U.S.A. It does, however, occasionally come across the Atlantic and is fairly regularly seen in small numbers in Great Britain and Ireland, generally in the company of other Arctic Geese which winter here.

CELLON AIRCRAFT FINISHES

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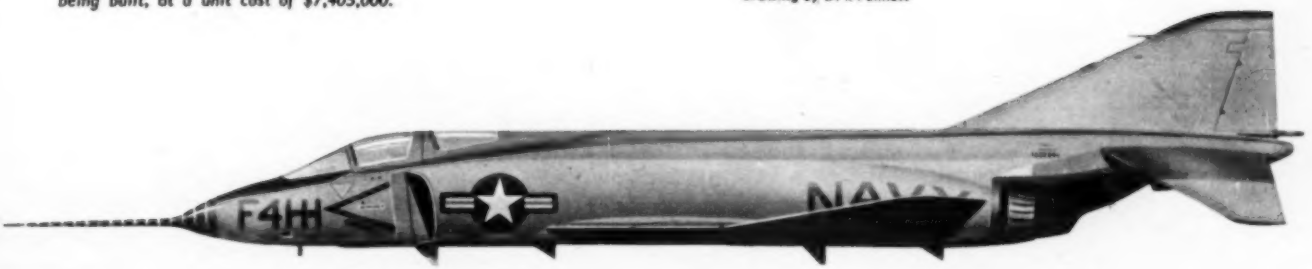
McDONNELL F4H-1

(two General Electric J79-GE-2)

Span	...	...	...	38ft 5in
Length	...	...	...	56ft

The McDonnell F4H-1 is in competition with the Chance Vought F8U-3 for selection as the standard future all-weather fighter of the U.S. Navy, and it differs from its rival in having two engines and two seats. The afterburning J79s confer a speed of about Mach 2, and the internal fuel capacity is enough for an unrefuelled range of over 1,500 miles. The drawing shows the first F4H to be completed—it flew at the beginning of June—carrying four Sparrow III air-to-air missiles, the fin and wing-tips of which can be seen projecting below the big fighter's fuselage. At present an evaluation quantity of 23 F4H aircraft is being built, at a unit cost of $7,405,000.

"Flight" copyright drawing by D. I. Punnett



Dawn Patrol, S.E.5As of No. 85 Squadron Led by Major Mannock, V.C., D.S.O., M.C. ROY NOCKOLDS

"Typhoon" Tactics MICHAEL TURNER

CLOUD AND CANVAS

ANOTHER REWARDING EXHIBITION BY THE AVIATION ARTISTS

London Airport—a Winter's Night DAVID SHEPHERD

AGAIN, for the fifth year in succession, the Society of Aviation Artists is holding its annual exhibition at the London Guildhall. As usual there is a strong core of competent, often exciting painting, with a fairly even balance in subject-matter between contemporary and vintage aircraft—and the expected addition of some glimpses into the outer atmosphere.

Immediately on entering the exhibition the strong action in *Typhoon Tactics* by Michael Turner holds one's attention. Full of movement and impact, it has all the essentials of vivid action, with rockets streaking away from the Typhoon towards an already glowing target.

Another painting of violent movement is *Comet Departure*, by G. Davison Coulson, the airliner flinging itself off the ground and out of the picture, spuming mist behind it from the rain-soaked runway. Also by Coulson, and in complete contrast, is *Gloster Gladiator—last of the R.A.F. Biplane Fighters*, flying straight and level and powerfully delineated against a subdued landscape. *Princess at Cowes*, by F. G. Draper, is a bright watercolour which does not show much of the aircraft, but is nevertheless pleasing—as is also *Caribou* (by the same artist), with the strong red tail of the aircraft upflung against a watery sky.

Roy Nockolds is strongly nostalgic in two of his pictures, *Sopwith Camels* and *Dawn Patrol*. The second is of S.E.5As of No. 85 Squadron led by Major Mannock. Portraying these high sentinels silhouetted against a pearly dawn sky over sombre smoky clouds, the painting evokes atmosphere and drama without any violent use of colour or composition.

Vast in size and credibly painted, *Lighting-up Time*, by A. Egerton Cooper, R.B.A., catches the viewer's fancy but leaves him feeling slightly earthbound: there is a little too much detail observed for that time of day, and dusk has not taken over sufficiently to turn the roads and villages into glinting necklaces of light.

Other fascinating aerial views are those of the Comet 4 over

A Rescue Under Turkish Fire—Sqn.-Cdre. R. Bell Davies, V.C., Picking up Lt. Smylie after Attack on Ferejik Station, Dardanelles Campaign, 1916 KENNETH MCDONOUGH

Hendon, 1936, "Fury" IIs, 25 Squadron PERCIVAL E. NORMAN

Diving Turn HAROLD DENT

Lighting-up Time A. EGERTON COOPER, R.B.A.

December 30th, 1940—Again Tonight? DAVID SHEPHERD

In Circuit for Kindley Field JOHN STOBART

English Electric P.1B, Altitude Test Flying, 1958 PAMELA DREW

Atmospheric Layers Intersected by the Earth's Magnetic Field W. HOWARD JARVIS

Runabout 1903 (Santos-Dumont in his Small Dirigible, Paris, 1903) J. T. ROBSON

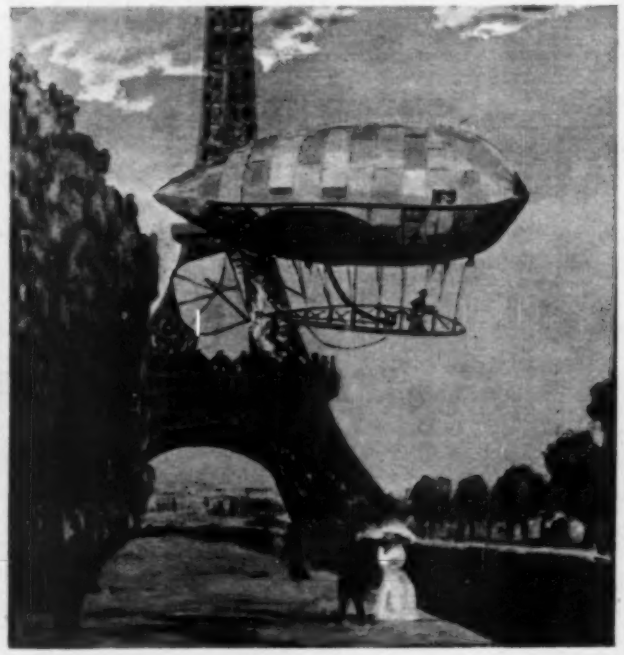
CLOUD AND CANVAS...

Southampton and over London's river, by David Shepherd, but it is *December 30th, 1940—Again Tonight?* (also by Shepherd) that captures one's imagination—with the evening sun catching ominous rolling dusk clouds gathering about St. Paul's and etching the lone Spitfire's wings in a dull amber hue. Another interesting painting by this artist is *London Airport—A Winter's Night*. Delicate in colouring, the airport buildings, under a brooding night sky, glimmer with warm yellow and orange lights, while the aircraft and coaches make tracks bleakly on the snow in the foreground.

Nicely drawn Furies of No. 25 Sqn. perform before the crowd in *Hendon, 1936*, by Percival E. Norman—a watercolour painting that has a lot of atmospheric interest; and in Kenneth McDonough's *Rescue Under Turkish Fire*, a very spirited action picture, a Nieuport flies right out through the smoke of a crashed aircraft.

Clear-cut and lit from below, the VC.10 slides in for a landing in John Stobart's *In Circuit for Kindley Field*, whilst in almost savage contrast, Pamela Drew's P.1B Lightning bludgeons its way across a turbulent dark green sky; then to the delicate, swiftly moving *Diving Turn* by Harold Dent, which is almost a monochrome in blue and fully suggests its title; and on to pure fantasy, as in W. Howard Jarvis's *Atmospheric Layers Intersected by the Earth's Magnetic Field*—such is the richness and variety of fare set out at this exhibition. Lastly, by no means least, but as a delightfully light-hearted end to this review, mention must be made of J. T. Robson's *Runabout 1903*, which depicts Santos-Dumont in his bright yellow dirigible passing low beside the Eiffel Tower.

Closing on October 11, this exhibition is well worth a visit, combining as it does so much of the best of two exciting worlds—painting and aviation. R. M.



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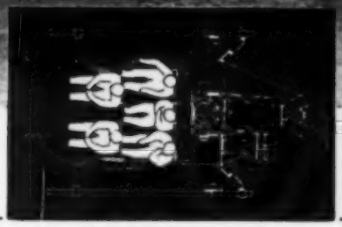

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With the latest Martin-Baker seats low level escape is sure and safe.

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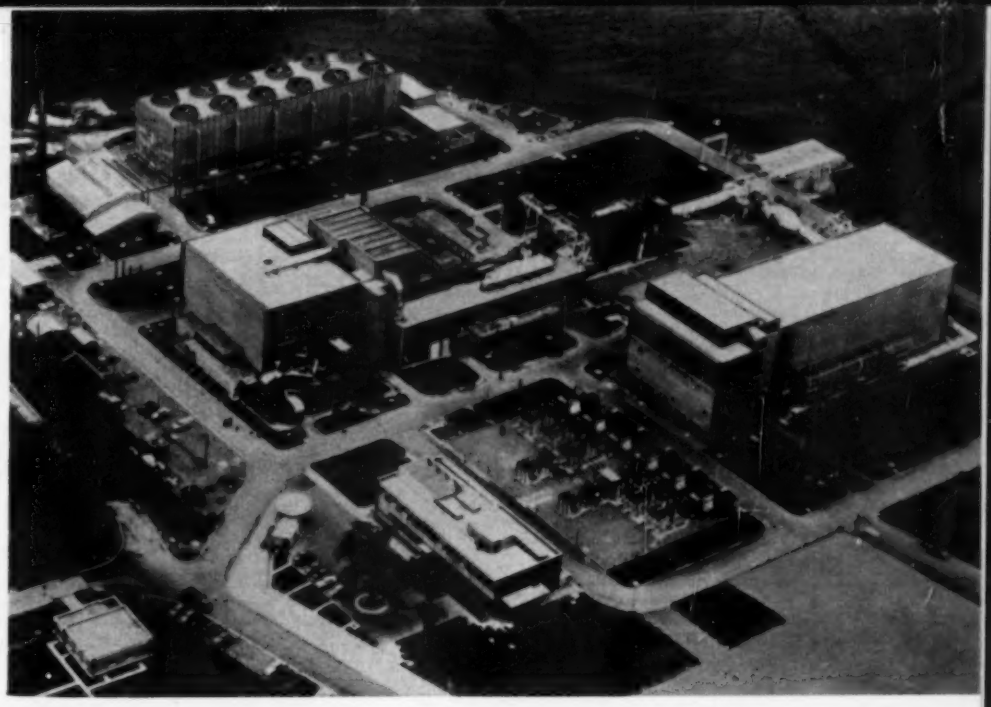
The new high-altitude establishment represents an investment of some £5.8m and is one of the most valuable facilities possessed by any aero-engine manufacturer. The various buildings may be identified with the aid of the drawing overleaf.



ROLLS-ROYCE'S PRIVATELY-FINANCED HIGH-ALTITUDE ESTABLISHMENT

ALTITUDE PLANT

SINFIN C is the vernacular appellation of a new high-altitude facility which Rolls-Royce have built for themselves adjacent to their existing research and development establishment at Sinfin "A" site, south of Derby. Opened by the Prime Minister on September 26 (as noted elsewhere in this issue), the new plant provides an object-lesson in the planning and execution of an establishment for testing advanced gas turbines. The total bill will be approximately £5,800,000 and Rolls-Royce have provided every penny of it. Some notes on the implications of such expenditure are provided at the end of this account.

That a high-altitude test plant would eventually be needed by Rolls-Royce has long been appreciated. Doubtless it would have cost much less to construct had it been started ten years ago, but the company have at least been able to draw upon the experience of others—particularly the N.A.C.A., in respect of the Lewis laboratory at Cleveland—and thus employ the latest techniques throughout. In the past, of course, altitude testing of Rolls-Royce engines has been carried out by actual flying from Hucknall, and it is well known that the National Gas Turbine Establishment have also undertaken *ad hoc* altitude testing for manufacturers.

It was in 1954 that Lord Hives, then chairman and managing director of the company, instituted a firm programme for the new installation. Our issue of March 16, 1956, gave the first news of this impressive undertaking. Since that time the characteristics of the plant have changed in certain respects and it is fair to describe the facility as the most capable engine-test plant in Europe and the British Commonwealth at the present time. For the record, the N.G.T.E. will have greater capacity when their long-term extensions are completed, and other altitude test plants are owned or operated by Bristol Aero-Engines (a blow-down facility for ramjets), D.H. Engines and Orenda. There are several in the U.S.A., the largest in the western world being at the A.E.D.C., Tullahoma.

Virtually all the design and construction of the new facility was sub-contracted. Rolls-Royce engaged a firm of consultant engineers who carried out the detail design to the customer's specification. The latter included two main high-altitude test cells, one of which is a universal cell capable of handling turbojets or turboprops. Each cell is supplied with treated air at the correct temperature and pressure for any desired flight condition. The limits of pressure and temperature at the engine intake are respectively 1 to 50 lb/sq in absolute (standard atmosphere is 14.7) and −90 to +190 deg C (standard atmosphere is 15). In addition, provision is made to exhaust the engine into an ambient pressure corresponding to any altitude up to 70,000ft. An outline of the operation of the plant is readily obtainable from a study of the perspective drawing overleaf, in conjunction with the accompanying diagram of the gas flow.

Almost all the air for the cells is taken in above the input (air treatment) building; and it is of passing interest to note that, notwithstanding the immensity of the flow, the mean airspeed at the intake is barely 5 m.p.h. Dust and other solid particles are removed by banks of electrostatic filters, and the bulk of the flow then passes to the input compressor (C6 in the drawings) which, like the five similar sets in the exhauster building, is an 11-stage axial driven by a 22,000 h.p. synchronous motor. Delivery from C6 is at 55 lb/sq in abs. and 190 deg C. As the flow diagram shows, the delivery is again split and the major proportion passes through a water-cooled heat exchanger (UC6, UC indicating "unit cooler"), an ammonia refrigerating plant (R1 and R2), a water separator WS for the removal of bulk rainwater, and finally a silica-gel drying plant (D1, 2, 3 and 4, not all of which are normally in circuit).

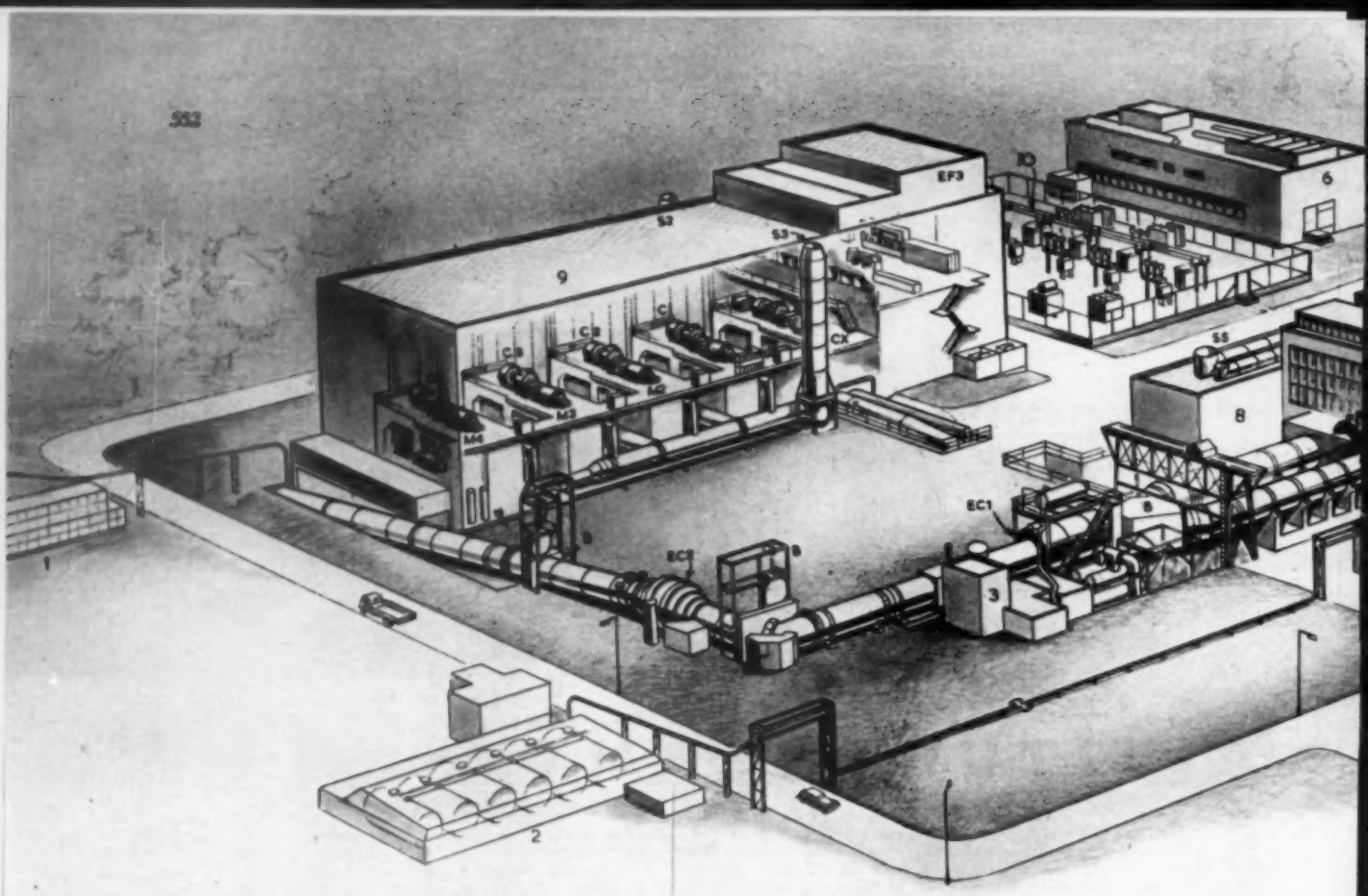
At this point the air is at 8 deg C and completely dry. Part of the flow is then diverted through the expansion turbine T1, emerging at any temperature down to −100 deg C. In conjunction with the main 8-deg flow, this air and the 190-deg air from C6 may be mixed to give the required intake conditions. There are no additional pre-heaters, so the maximum temperature of 190 deg corresponds to a peak Mach number of approximately 2.3 at altitudes above the tropopause, the maximum pressure of 55 lb/sq in being more than adequate for M=2.3 at the latter height.

A design feature worth mentioning is the manner in which the mixing box MB2 is coupled directly beneath the turbine T1. The latter can only bear a load of 3,000 lb and the stainless-steel mixing box weighs over 40 tons; accordingly the box is suspended on a low-rate spring assembly, the latter bearing all but 3,000 lb of its weight and accommodating all changes in size and shape between the hot and cold condition.

Any delivery from C6 in excess of that required by the engine under test is passed through the recuperating turbine T2, both this and T1 being mounted on the same shaft as C6 to reduce the electrical load required by the set. The input supply can also be augmented by air from the exhauster building.

Having been brought to the desired intake conditions, the air may be passed either to cell 1 or to a separate compressor-test cell CT, and an additional by-pass circuit is included for final control during engine accelerations. High-altitude cell No. 2 is not yet complete, but its position is indicated in the flow diagram; it includes a dynamometer for turboprops, the drive-shaft for which has to pass through a pressure-tight seal where it leaves the cell.

As the flow diagram shows, cell 1 is divided into a plenum chamber and a cell proper. Air is fed into the first and passes through a gauze debris screen and four banks of straighteners before entering the bell-mouth and passing through the engine under test. Aircraft intakes and duct systems will not be investigated. Separating the plenum chamber from the cell proper is a bulkhead, in the centre of which is a large orifice with a clearance seal through which is inserted a calibrated air meter connected directly to the powerplant. The high-altitude cell itself weighs some 125 tons and is firmly anchored at the rear, the forward end being supported on double-roller trolleys to permit an axial expansion of more than 2in. Engines for testing are prepared on the



Key to Code Designations

B Isolating bulkheads and make-up pieces.

C C1, C2, C3, C4 and C6 are identical axial compressors, with eleven stages of steel blading. At 4,150 r.p.m. each operates at a pressure ratio of 3.8:1 and, with atmospheric inlet, handles a mass-flow of 200 lb/sec. CX is a smaller compressor, with ten stages of blades; at 7,720 r.p.m. it operates at a pressure ratio of 3.8:1 and, with atmospheric inlet, handles 68 lb/sec, although the full flow of 200 lb/sec has to be accommodated when CX is compounded with other exhauster sets.

CT This is a rig for the testing of aero-engine compressors, driven by the air turbine T4.

D D1, D2, D3 and D4 are air driers; the complete installation comprises four adsorbers, each containing 16,000 lb of silica gel which is reactivated by steam-heated air and then cooled by water and next by brine down to 2 deg C; the capacity is 160 lb of saturated air per second at 55 lb/sq in abs., which is dried sufficiently to preclude ice-formation at 0.9 lb/sq in abs. at −112 deg C.

EC Exhaust coolers, downstream of the test cells; EC1, the primary cooler, is a six-drum water-tube heat exchanger pressurized by a nitrogen system to 230 lb/sq in, and it can reduce the temperature of 150 lb of dry air per second at 5 lb/sq in abs. from 1,730 to 107 deg C; EC2, the secondary cooler, has multiple matrices surrounded by water, and it cools the same flow, at 3.3 lb/sq in abs., from 107 down to a minimum of 40 deg C.

EF Electrostatic filters to remove dust and other particles from the intake air; EF1, the input filter, handles 160,000 cu ft/min; EF2, the compressor test-rig filter, handles 224,000 cu ft/min; EF3, the exhauster filter, handles 320,000 cu ft/min.

M M1, M2, M3, M4, M6 and MX are identical synchronous driving motors for the compressor sets; each is continuously rated at 22,000 h.p. at 1,500 r.p.m., taking 50 c/s current at 11 kV.

MB MB1 and MB2 are large mixing boxes in which two or more flows are combined.

R R1 and R2 are the two branches of the refrigerating plant; the charge of ammonia is 20,000 lb, the flow of cooling water 2,400 Imp. gal/min and the capacity 160 lb of air per second, this flow being cooled from 29 down to 2 deg C.

S Large vertical silencers through which the efflux from the plant issues to atmosphere.

T T1, T2, T3 and T4 are two-wheel, single-stage turbines. T1 is the air-cooling turbine, handling 160 lb/sec at 4,150 r.p.m. and providing a minimum outlet temperature of −104 deg C; T2 is the input recuperating turbine, handling 154 lb/sec at 4,150 r.p.m.; T3 is a further recuperating turbine in the circuit to the compressor test-rig, mounted on the 7,720 r.p.m. shaft of CX and handling 181 lb/sec at 155 lb/sq in abs. or 57 lb/sec at 48.5 lb/sq in abs.; T4 is the air-driven turbine for the compressor test-rig, controlled within ±0.05 per cent over the speed range from 3,000 to 11,000 r.p.m., and having an output of 15,000 h.p. at 9,000 r.p.m. with an inlet pressure of 155 lb/sq in abs. and 3,000 h.p. at 7,720 r.p.m. with an inlet pressure of 48.5 lb/sq in abs.

UC These six "unit coolers" are water-cooled heat exchangers.

V All items incorporating a V are valves; prefixes denote the exhauster set involved (such as "4V3") or the turbine set (such as "TV4").

WCT Shown in the perspective drawing, the water cooling tower handles 71,300 Imp. gal/hr and dissipates 504,000,000 B.Th.U./hr; beneath it is the main water reservoir, of 750,000 Imp. gal capacity.

WP There are three circulating water pumps; each is a double-entry centrifugal unit, which at 975 r.p.m. delivers 10,000 Imp. gal/min against a head of 90ft.

WS The water separator in the input circuit.

WTP The water-treatment plant handles 71,300 Imp. gal/hr and reduces the parts-per-million of $CaCO_3$—a measure of the hardness of the water—from 64 to 3.

ALTITUDE PLANT . . .

floor below, mounted on a transportable portion of the test cradle. Electrical and manometer connections from the engine are made to centralized battery plates on the cradle, and the whole assembly is then lifted by crane through a large trap door and into the test cell. The latter has a 20ft door weighing 16 tons, sealed by a rubber extrusion pressurized with water.

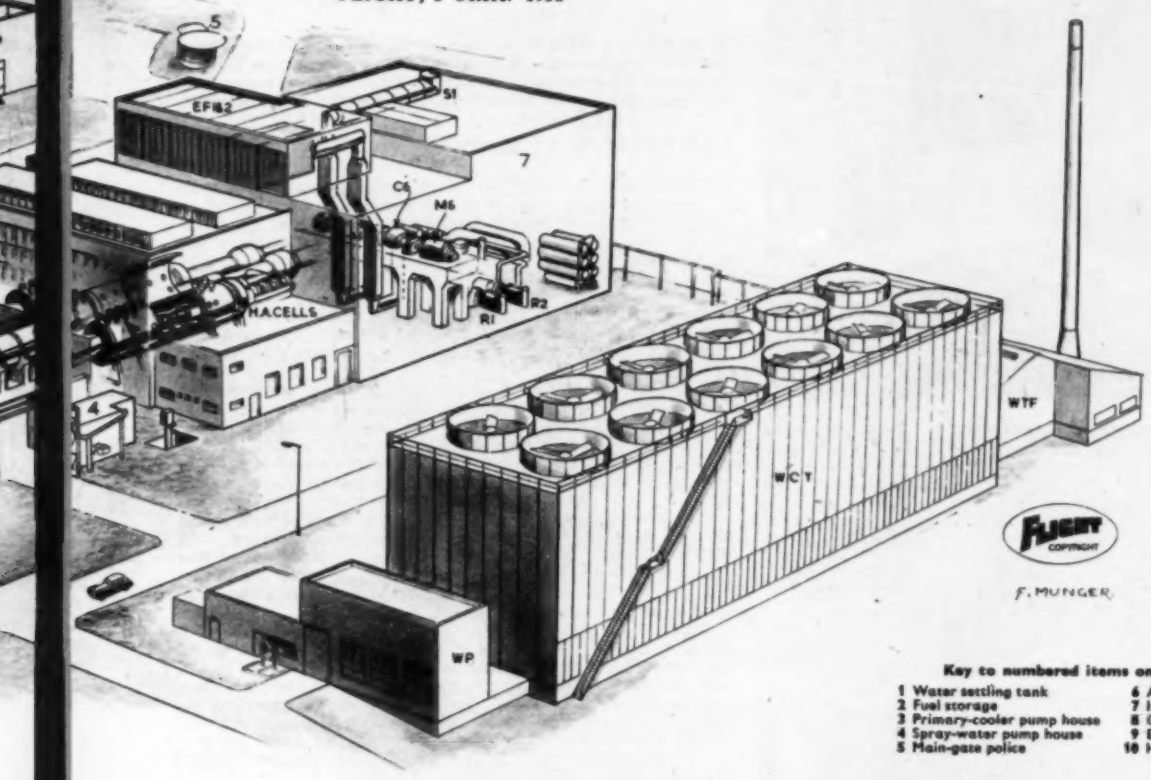
Once in the cell, the engine is bolted down to a floating cradle connected to the thrust-measuring mechanism. The tail pipe or afterburner discharges into a water-cooled duct, the diffuser section of which is provided with peripheral water sprays to provide a safety curtain against possible detonation during the engine-starting cycle.

After passing through the wall of the input building, the 10ft exhaust duct passes to the primary cooler, this distance of 143ft being water-jacketed. It then joins the duct from cell 2, and immediately downstream is the primary cooler EC1. The latter is virtually a six-drum water-tube boiler, cooled by chemically pure water circulated through a closed loop; included in the circuit is a heat exchanger which is in turn cooled by the main circulating water system. The closed circuit is prevented from boiling by being pressurized with nitrogen at 230 lb/sq in, and EC1 alone reduces the temperature of the exhaust gases from a maximum of 1,730 deg C to a minimum of 107 deg C.

The cooled gas passes through a multi-vane butterfly valve, precisely positioned to govern the ambient pressure at the engine tail pipe, and then enters the secondary cooler EC2. This is akin to a locomotive boiler, in that the gas is divided through numerous matrix-type elements surrounded by water from the main cooling system. Although the actual cooling length is barely 10ft, EC2 cools the flow still further to below 70 deg; the water from the sprays in the high-altitude cell condenses out in EC2, giving a final flow suitable for transmission to the exhauster building.

The latter is reached through 370ft of duct, separate branches leading to the five exhauster compressors C4, C3, C2, C1 and CX. The first four are identical with C6; CX has a volumetric size one-third as great, but as it may have to handle the full flow of

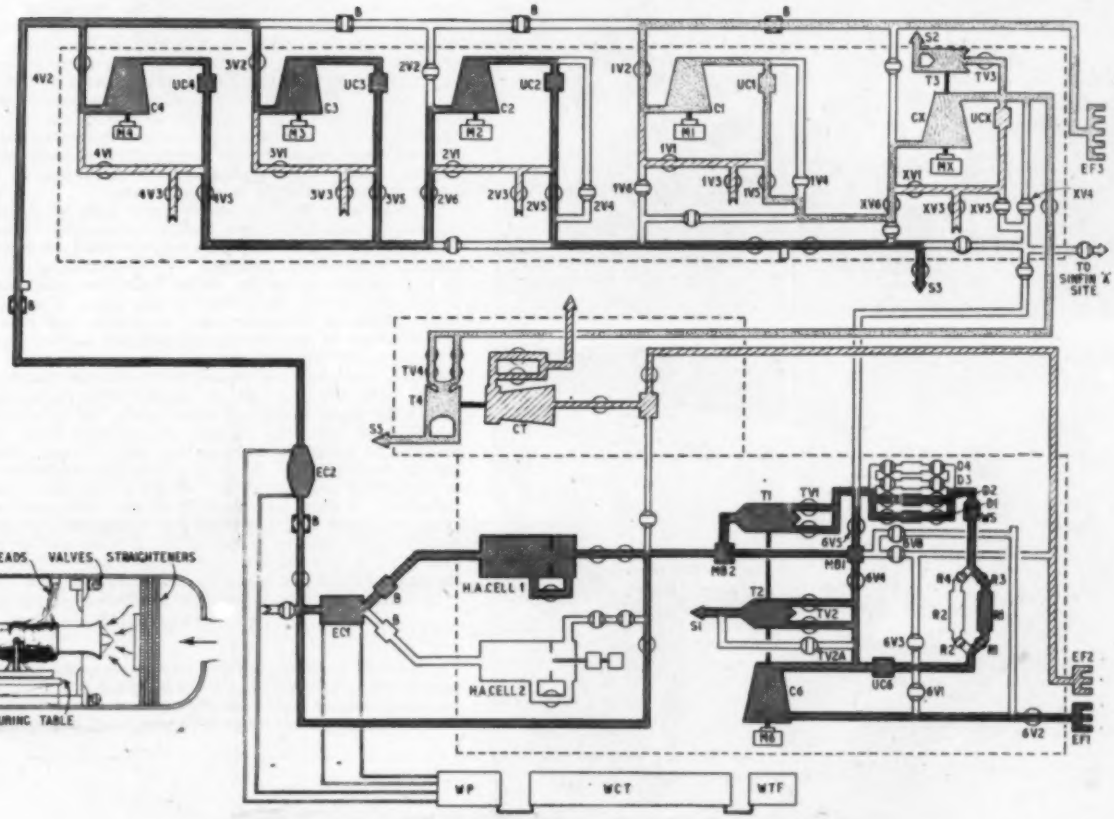
WATER

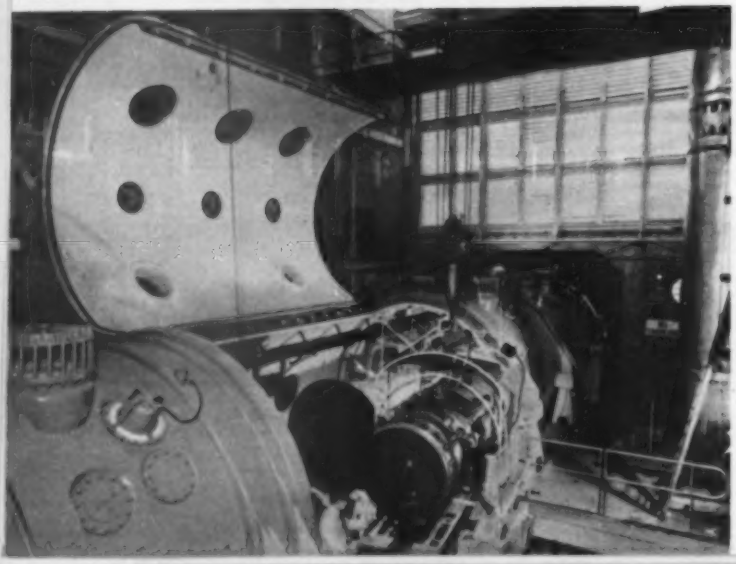


Key to numbered items on drawing above

1 Water settling tank	6 Administration block
2 Fuel storage	7 Input building
3 Primary-cooler pump house	8 Compressor rig building
4 Spray-water pump house	9 Exhauster building
5 Main-gate police	10 High-voltage sub-station

Taken together these drawings give a clear outline of the basic layout of the new Rolls-Royce facility. The perspective drawing illustrates the whole plant, the viewpoint being diametrically opposite to that of the heading picture on p. 551. The circuit diagram shows the main gas flows as they would be set up for a typical test-run with the existing high-altitude cell. It may be noted that only part of the circuit is in use, and that half the drying and refrigerating capacity is out of circuit. All major units are referred to by a system of letters and figures, both in these drawings and in the text. The main key appears opposite. Different types of shading are used in the flow diagram to denote the respective flows of air or gas. The various buildings are outlined in broken lines. The small sketch (bottom left) shows the first test cell in greater detail, with a Conway installed.





On the left is a scene at one end of the main control room, from which the basic operation of the whole plant is governed; on the wall can be seen an animated circuit diagram. Below, left, is a view from this room, showing the exhauster sets beyond the double windows.

ALTITUDE PLANT . . .

gas it has the same 22,000 h.p. drive as the remaining sets, with an added step-up gearbox. The flow diagram gives an indication of the multiplicity of possible arrangements which may be chosen in the exhauster building, according to the requirements of the engine under test. For example, C4, 3 and 2 may be connected in parallel to discharge into C1 and CX in series; or, as our diagram shows, C4 and C3 can together discharge through C2 with an entirely separate flow through C1 and CX. As already noted, a cross-connection is provided between the input and exhauster buildings to supplement (or in emergency to replace) the delivery from C6.

In order to improve plant utilization, a separate compressor test rig house CT has been constructed adjacent to the input building. Two of the exhaust compressors are compounded in series to provide air at 155 lb/sq in and 200 deg C, which is taken through an external duct and fed to a 15,000 h.p. air turbine. The latter has a direct drive to the test compressor giving any speed between 3,000 to 11,000 r.p.m., and the drive shaft incorporates an optical torquemeter. Air for the rig is obtained either from atmosphere or from the input circuit at any temperature between −55 and +180 deg C. The exhauster building is so organized that three compressors can be used on altitude duties in connection with one of the high-altitude cells while the remaining two compressors provide air for the CT rig.

Although rather outside the scope of the present narrative, there is another circuit worthy of mention. The pipe at the extreme right of the flow diagram takes air, at 200 lb/sq in abs. and 200 deg C, to feed another part of the Sinfin complex where combustion test houses are installed. In addition, provision has been made for a wind tunnel, with a working section approximately 3ft square, capable of testing models at up to Mach 4. At an appropriate future period this will be installed between the input and exhauster buildings.

Throughout the design of the whole plant the utmost emphasis has been laid on ensuring safety and preventing damage either to the installation or to powerplants under test, and automatic trips are provided for all anticipated ailments. Nerve-centre of the plant is the main control room, which governs the basic operation of the complete establishment, sets up the required circuits and establishes primary, coarse control. A secondary control room immediately above the cells accommodates the engine testing staff and an assistant controller, the latter effecting the precise variations to the air supply which may be demanded by the test schedule. A further control room is provided in the compressor rig building. As might be expected, all fast-acting valves are operated hydraulically, while the isolating valves are operated by electric screw jacks, control in each case being by buttons in the main control room. The hydraulically positioned valves which control temperatures and pressures around the circuit are operated automatically via magnetic-amplifier systems energized by signals received from pressure and temperature sensing points. The desired settings can be programmed in advance of a test, the complete cycle thereafter being automatic.

One can write at great length about such an installation and still fail to convey the fact that it represents a priceless asset, without which Rolls-Royce aero engines could not remain in their present competitive position. Notwithstanding an impatient schedule which leaves the visitor breathless, the standard conducted tour of the plant takes a full hour. The visitor comes away breathless, exhausted and deafened, and bewildered by the profusion of psychologically selected colours—all doubtless pleasant to the eye—on the vast objects with which he is surrounded. Although the second cell is not yet complete, the first is very definitely in action and contained an Avon 524 when we visited the plant recently. In fact, some 200 hr of actual engine testing have been run during the commissioning period, and Rolls-Royce are prepared to say that the results are "very interesting and encouraging." Whether or not the company are prepared to allow their competitors to buy time in the plant remains to be seen, but it will certainly be fully utilized throughout the coming years. So good is the silencing that much of the running will be done at night; the only undesirable periods will be peak hours, totalling 7 hr per day during the four winter months only, when the price of electricity would be almost prohibitive.

In conclusion, it is appropriate to examine the implications of

(*concluded on page 558*)

The test cells are controlled directly from an engine-test control room, seen at left, above. Situated in the input building, this room contains an engine console (right) and the assistant controller's console (left). The bottom picture shows a Conway being hoisted into Cell 1.

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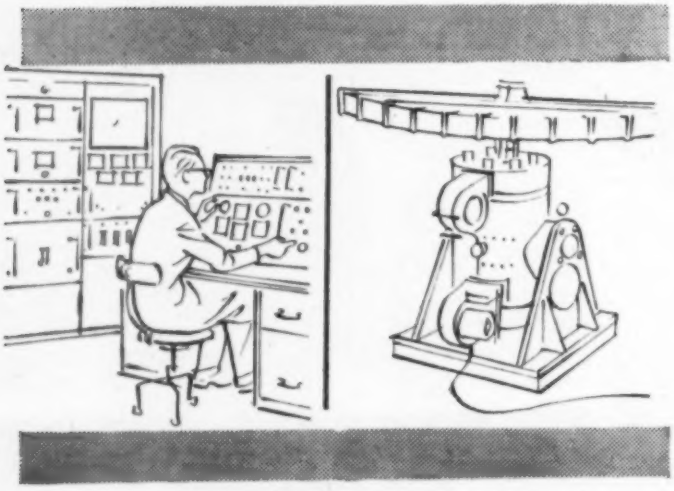

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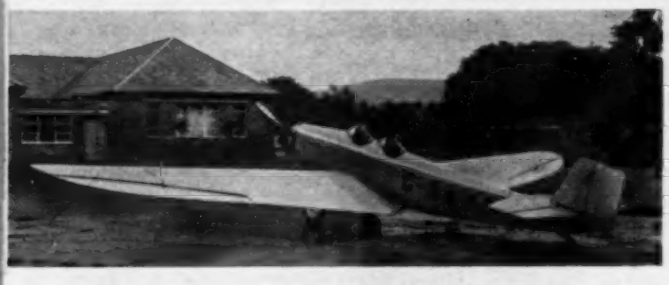
EE136

Right, the new Aero-Plane produced by the U.S. Aerocar company (see news item below). This wing-folding four-seater is powered by a Lycoming 0-320 engine driving the tail propeller.

Below, this 28-years-old Klemm L.25, powered by a nine-cylinder Salmson, was recently flown from Newtownards to Dumfries (see news item below).



Club and Gliding News

THE advanced flying course of the Association of British Aero Clubs has been revised by the Association's pilotage committee. Intended for pilots who hold their Private Pilot's Licence and wish to continue towards a higher qualification, the advanced course falls into two stages. The first stage, of 10 hr 45 min, includes consolidation training, instrument flying, aerobatics and night flying, while stage two constitutes a further 16 hr 45 min of similar training, progressing to night cross-countries. Although the advanced course is a separate entity with its own diploma, it is designed as an integral part of the training syllabus for the Commercial Pilot's Licence.

Among other technical activities within the A.B.A.C., a civilian version of the *Instructors Handbook* is now approaching completion, and *Pilot's Notes* for three more aircraft types (Gemini, Aiglet and Chipmunk) will be published in the New Year.

NAVIGATION and landing competitions of Plymouth Aero Club were flown on Sunday, September 14. The Barber Cup landing contest was won by W. D. Taylor in Tiger Moth G-ANJD, and the same aircraft was flown into first place in the competition for the Butland Navigation Trophy by T. Szparowski.

NEWLY appointed hon. secretary of the British Women Pilots Association is Mrs. Mavis Harriott. Miss Janet Ferguson, who previously held this position, continues to serve on the committee of the Association.

A RECENT arrival at Dumfries was the vintage Klemm L.25 G-AAXK, flown over from Newtownards, Northern Ireland, by Hector Monro and Robert Grant. This machine had been restored to flying condition at Newtownards by its previous owner, John McConnell. Powered by a nine-cylinder Salmson engine of 40 h.p., the Klemm was originally built in 1930 and is among the oldest aircraft on the British Civil Register at the present time. Its 100-mile flight from Newtownards to Dumfries took 1 hr 45 min.

PROPOSALS have been made by the Gliding Federation of Australia for a two-week national gliding school for instructors and ground engineers, to be held at Gawler Aerodrome, site of Adelaide Soaring Club, from October 18 to November 2. Advanced training would be provided, the instructors' flying course including instructional technique, instrument flying, test flying, cross-country soaring and the handling of various types of sailplane; and the engineers' course including flying as well as ground technical instruction. Aircraft expected to be available are the Adair-Gurr Altair, Olympia, Schneider Kingfisher, Kookaburra and two ES-49s.

Discussing light aircraft—(2) in Surrey. Douglas Bianchi, Linnet constructor; Neville Duke, Linnet pilot; and Charles Gardner and Joe Bewsher of Vickers-Armstrongs (Aircraft), Weybridge. The occasion was the Fair Oaks At Home of the Vickers (Weybridge) Flying Club.

MOST recent version of the Aerocar "flying automobile" is the Model 2 Aero-Plane, recently rolled out at Longview, Washington, and illustrated above. The new model does not have the convertible feature of the earlier Aerocars, i.e., it is simply an aircraft and is not roadable. With the removal of the various car components, a reduction in weight of about 360 lb has been achieved. This permits the Model 2 to carry four passengers, 60 lb of baggage and full fuel at the same gross weight (2,100 lb) as the earlier two-seat Aerocars. The Model 2 employs the same wings, powerplant, tail propeller arrangement and basic structure as the original and only the nose and landing gear are different. Magnesium and glass-fibre are used extensively and have effected a considerable weight reduction.

The new nosewheel features a spring/oil arrangement which is expected to need the minimum of maintenance. The single leg main gear is of original design and has a double tapered spring installation so designed that the leg flexes along an S-curve during the landing impact. Standard Goodrich wheels and brakes are fitted, and the steerable nosewheel is linked to the aileron control. The Lycoming 0-320 engine delivers 143 h.p. to the rear-mounted Hartzell propeller by means of a Dodge Flexidyne "dry fluid" drive and a Spicer drive-shaft. The Aerocar folding-wing feature has been retained, minimizing the hangar space required, and the general aerodynamic cleaning-up which has been effected is expected to give an improved flight performance compared with the earlier Aerocar.

ANNUAL general meeting of the Lancashire Aero Club will be held on Wednesday, October 15, at the clubhouse, Barton Aerodrome; and the club's annual dinner-dance will be on Friday, December 12, at the Alma Lodge Hotel, Stockport.

Discussing light aircraft—(1) in New Zealand. Mr. R. G. Casey, Australian Minister for External Affairs and active private pilot; Capt. O. P. Jones, B.O.A.C.; and Mr. G. N. Wells, T.E.A.L. station manager at Auckland and owner of the background Ercoupe.

ECONOMY AND PERFORMANCE COMBINED

IN KIRBYMOORSIDE'S LATEST SAILPLANE

Slingsby Swallow

THE growing popularity of gliding over the last few years has resulted in an increased number of pilots wishing to own their own aircraft, and this has opened up markets for new types of low-priced sailplanes. Most private gliders are owned by syndicates of up to four people and it is usual for costs to be kept to a minimum by the owners carrying out most of the maintenance and repair work on their own aircraft. An increasing number of owners, particularly abroad, are in addition assembling their own sailplanes from kits, thus saving the cost of assembly and finishing and, in the case of exports, a major part of the shipping charges.

It is with this market in mind that Slingsby Sailplanes, Ltd., of Kirbymoorside, Yorks, have introduced the Swallow, an aircraft they describe as a small high-performance sailplane. Although in most ways a straightforward and conventional aircraft, the Swallow contains noteworthy features. The prime object in the design has been to produce a sailplane with a performance sufficiently high to appeal to experienced pilots, yet with a structure that can be assembled and maintained by persons of no great skill.

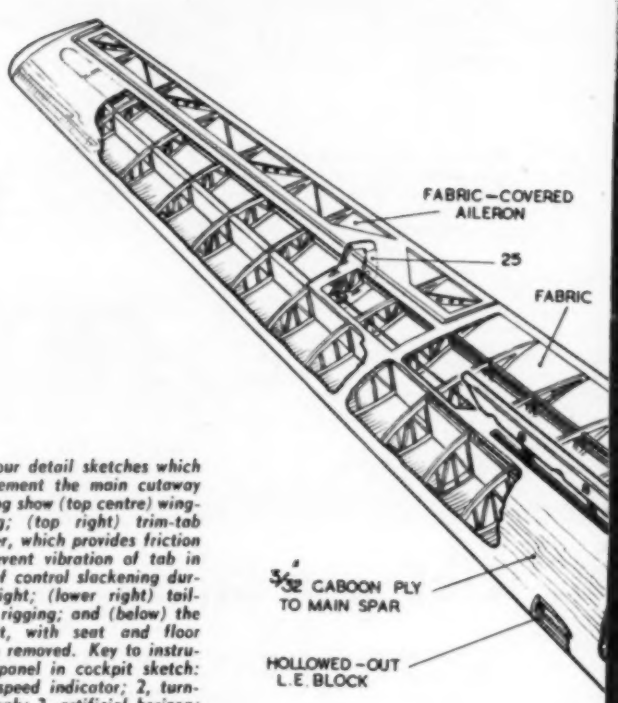
Aerodynamically the Swallow is a follow-on from Slingsby's recent family of laminar-flow sailplanes such as the Skylarks and the Eagle. The aerofoil sections used for the wings are the same throughout this series and consist of an NACA 6 series section at the root and one of the older 44 series at the tip. Low-drag characteristics are obtained by building the forward 40 per cent of the wing chord to a high standard of accuracy which allows a low degree of chordwise waviness in the profile.

The original philosophy behind the design called for a laminar-flow wing of small span and low aspect-ratio. The reduction in profile drag as a result of laminar flow was to compensate for the higher induced drag caused by the low aspect-ratio. The large wing-area, a further result of low aspect-ratio, would give a low wing-loading to provide suitable slow-flying characteristics and, at the same time, would also provide a large base on which to carry the parasite drag of the somewhat rugged fuselage. The success of this philosophy, as always, depended on the compromises made between the various conflicting requirements.

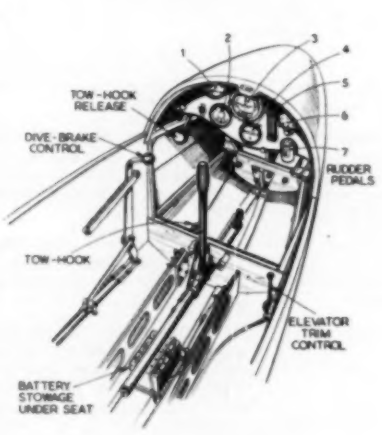
The idea of small sailplanes is not new; in recent years considerable interest has been shown in them in America and Australia. Suggestions have been put forward for machines as small as 30ft in span but it became obvious during preliminary work on the Swallow design that a span of 12 m (39.5ft) would be required to provide an acceptable performance. The Swallow first flew in October 1957 with a span of 12 m but, after the early tests, it was decided to increase it to 13.2 m and so obtain additional performance. Full performance tests have yet to be carried out but it is clear from the flying done on the prototype that the best gliding angle is around 1 in 25. This particular aircraft, as a result of modifications and repairs, lacks the finish that can be expected on the production machines; and it is not equipped with tip fairings on wings or tail unit or a canvas fairing on the main skid. It therefore seems probable that owners willing to clean up their aircraft can expect L/D ratios in excess of 1 in 26.

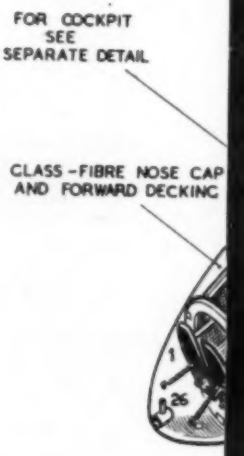
For an aircraft to become popular, performance is not the only consideration; it must also have good handling qualities and be pleasant to fly. The Swallow, being a small machine, is very crisp on the controls. In bank the movement of the wings can be said almost to follow the angle of the stick, while in pitch the speed picks up rapidly as soon as the controls are moved forward. Considering the snappy controls the stall is surprisingly gentle—in fact it is doubtful if a true static stall can be obtained, as the machine can be flown continuously at any c.g. position with the stick fully back. In this condition there is a marked buffet and the aircraft wallows and has a comparatively high rate of sink, but full control is still available in all planes. The stalling characteristics make it virtually impossible to spin the machine inadvertently and several attempts are often required before it can be made to spin intentionally.

For pilots with a taste for aerobatics the Swallow will have a special appeal as it is cleared for more manœuvres than is any other British sailplane. Its repertoire includes stalls, loops, spins, tight turns (3½g), stall turns, chandelles, rolls, half loop and roll

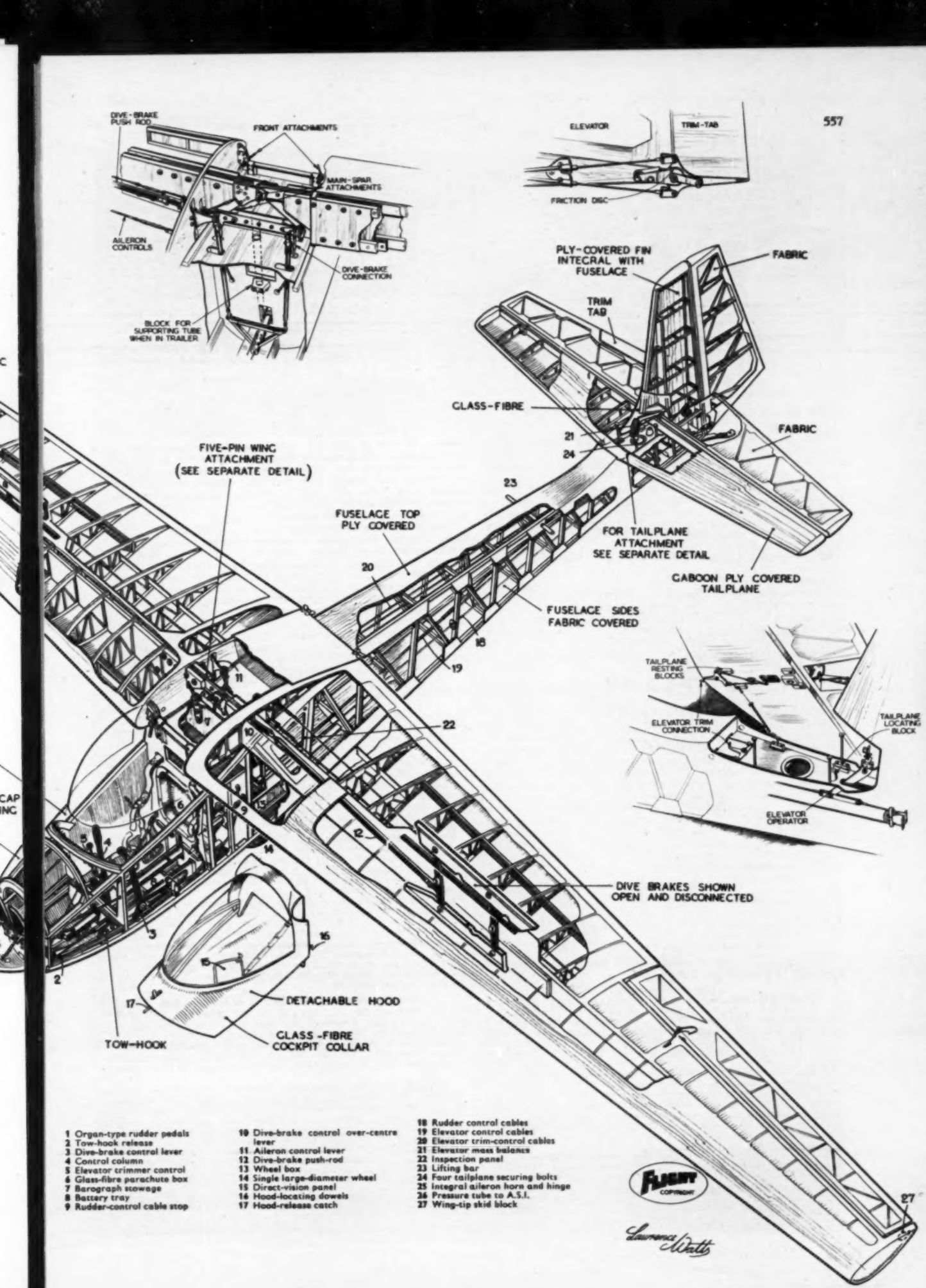


The four detail sketches which complement the main cutaway drawing show (top centre) wing-rigging; (top right) trim-tab damper, which provides friction to prevent vibration of tab in case of control slackening during flight; (lower right) tail-plane rigging; and (below) the cockpit, with seat and floor panels removed. Key to instrument panel in cockpit sketch: 1, Airspeed indicator; 2, turn-and-bank; 3, artificial horizon; 4, Horn variometer; 5, Cosim variometer; 6, altimeter; 7, Cook compass.





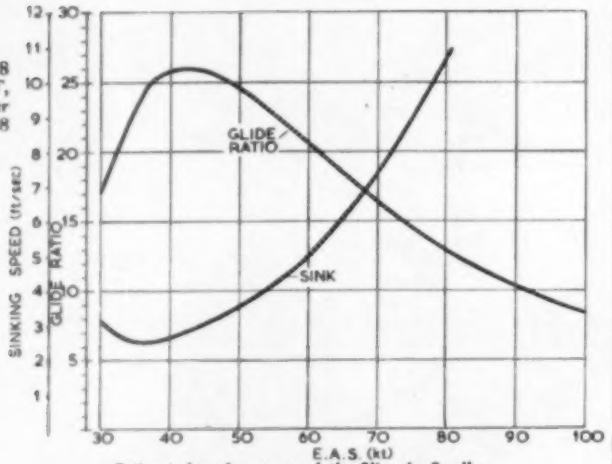
"Flight" photograph



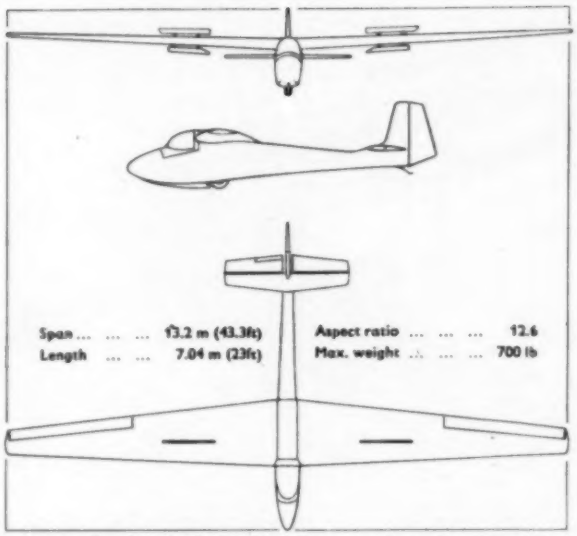
1 Organ-type rudder pedals
2 Tow-hook release
3 Dive-brake control lever
4 Control column
5 Elevator trimmer control
6 Glass-fibre parachute box
7 Barograph stowage
8 Battery tray
9 Rudder-control cable stop
10 Dive-brake control over-centre lever
11 Aileron control lever
12 Dive-brake push-rod
13 Wheel box
14 Single large-diameter wheel
15 Direct-vision panel
16 Hood-locating dowels
17 Hood-release catch
18 Rudder control cables
19 Elevator control cables
20 Elevator trim-control cables
21 Elevator mass balance
22 Inspection panel
23 Lifting bar
24 Four tailplane securing bolts
25 Integral aileron horn and hinge
26 Pressure tube to A.S.I.
27 Wing-tip skid block

FLIGHT COPYRIGHT

Laurence Watts



Estimated performance of the Slingsby Swallow.



SLINGSBY SWALLOW . . .

out, and inverted flying. At present certain of the manœuvres are allowed only when the aircraft is ballasted to the c.g. forward condition, but it is expected that full clearance will be obtained at all c.g. positions in due course.

The general construction of the machine is clearly shown in the cut-away drawing. The fuselage nose has the now-familiar lines of the Skylark series but behind this it fairs into a square section. The tail units are basically components from the Skylark 2 except that the tailplane attachment to the fuselage is by means of four bolts, a simple method which gives a very rigid assembly.

Wing-attachment fittings are mounted on two main frames and mate with fittings on the main and nose spars. To rig the wings they are rested in position on the fuselage and the pins are inserted through the main and nose spar fittings. These fittings are co-axial and allow the wingtips to be rested on the ground. The rigging is completed by raising the tips and inserting the pin through the top fittings. Three people have removed the machine from a trailer and rigged it for flight in ten minutes.

Certain criticism has been directed at the Swallow from some quarters in that it does not make use of new constructional developments, such as foamed plastics and sandwich structures. Slingsby's answer is that, although the new techniques doubtless save weight and possibly cost, they may complicate repair and maintenance. More than half of Slingsby production is sent abroad and with the Swallow it will be possible to include in the crate sufficient material for several years' repairs.

Suggestions have also been made that new sailplanes should be made in metal. Here again the makers point out the question of repairs which would involve much more elaborate equipment; and also the considerably higher tooling cost, which would probably result in a higher selling price. The Slingsby company also questions whether a metal sailplane has a longer life than a wooden one. Aircraft built at Kirbymoorside 25 years ago are still flying.

The Swallow is a new design and only time will tell whether it is a commercial success. So far, only the first production aircraft has been delivered—to the Border Gliding Club in South Africa. Reports received from the many pilots who have flown the type are favourable and give the makers good reason for optimism.

ALTITUDE PLANT (continued from page 554)

such a facility in a more general manner. The chief executive of Rolls-Royce, Mr. J. D. Pearson, has stressed that a modern aero engine of the calibre for which his company is renowned cannot be developed for an expenditure less than many millions of pounds, and this will be especially true of future powerplants. If a company is to stay in business, every penny which it spends must be recovered in sales, and—although the true picture is of course far more complex—it could be argued that Rolls-Royce's capital invested in the new high-altitude plant will have to be recovered in this manner; and the position is made more difficult by the fact that future production runs are likely to be measured in hundreds of engines, rather than in thousands. At the same time the price of every engine has to be minimized, since this is a key factor in ensuring commercial success.

Rolls-Royce do not wish to give the impression that a bill of £5.8m is about to be amortized against future sales of commercial aero engines; nothing could be further from the truth. The company are in business to stay, and regard their vast new tool as a long-term investment. It will assuredly repay them handsomely.

CONTRIBUTORS TO THE PLANT

The following names of contractors and suppliers are from lists provided by Rolls-Royce, Ltd.:—

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Aiton and Co., Ltd., circulating and spray water piping; John Booth and Sons (Bolton), Ltd., building steelwork; British Brown-Boveri, Ltd., compressors and turbine sets; Brown and Tawse Tubes, Ltd., fuel and oil systems, pipework and equipment; Chatwood-Milner, Ltd., air bulkheads; H. W. Cullum and Co., Ltd., acoustic splitters at air intakes and exhaust; Detuners, Ltd., silencers; Johannes Erhard H. Waldenmair Erben, air valves.

Foster Wheeler, Ltd., primary and secondary gas coolers and ancillary equipment; Ferranti, Ltd., transformers; Foxboro-Yoxall, Ltd., equipment for control of air systems; Gee, Walker and Slater, Ltd., civil engineering; G. A. Harvey (London), Ltd., ducting and pressure vesse's; Head Wrightson Processes, Ltd., cooling tower; Heenan and Froude, Ltd., test cell thrust measuring equipment; Johnson and Phillips, Ltd., cabling; Keelavite Rotary Pumps and Motors, Ltd., valve-actuating equipment.

Herbert Morris, Ltd., travelling cranes; Newalls Insulation Co., Ltd., insulation; Rashleigh Phipps and Co., Ltd., electrical insulation; A. Reyrolle and Co., Ltd., 33,000 V switchgear; Serck Radiators, Ltd., air coolers; Sigmund Pumps, Ltd., circulating water pumps; Silica Gel, Ltd., chemical air dryer; L. Sterne and Co., Ltd., refrigeration plant; Sturtevant Engineering Co., Ltd., electrostatic filtration plant; John Thompson (Wolverhampton), Ltd., boiler plant; Wharton Crane and Hoist Co., Ltd., travelling cranes; F. H. Wheeler and Co., Ltd., power and lighting installation; Zimmerman and Jansen, air valves.

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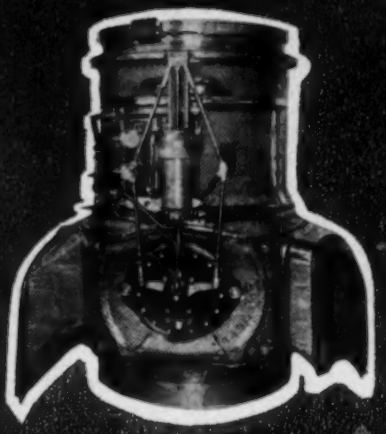
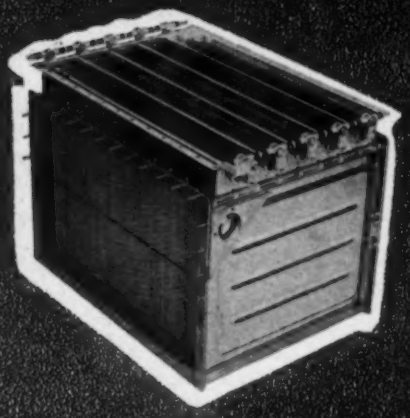


1

These thermal blankets are made of refractory fibre cased in .004 inch (.1016 mm) stainless steel. They are made-to-measure and are extremely light, the dimpled construction being responsible for their great strength. Specified for Rolls-Royce and Armstrong Siddeley jet and turbo-prop engines, these particular examples are shown fitted to the Rolls-Royce thrust reverser for the de Havilland Comet.



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3

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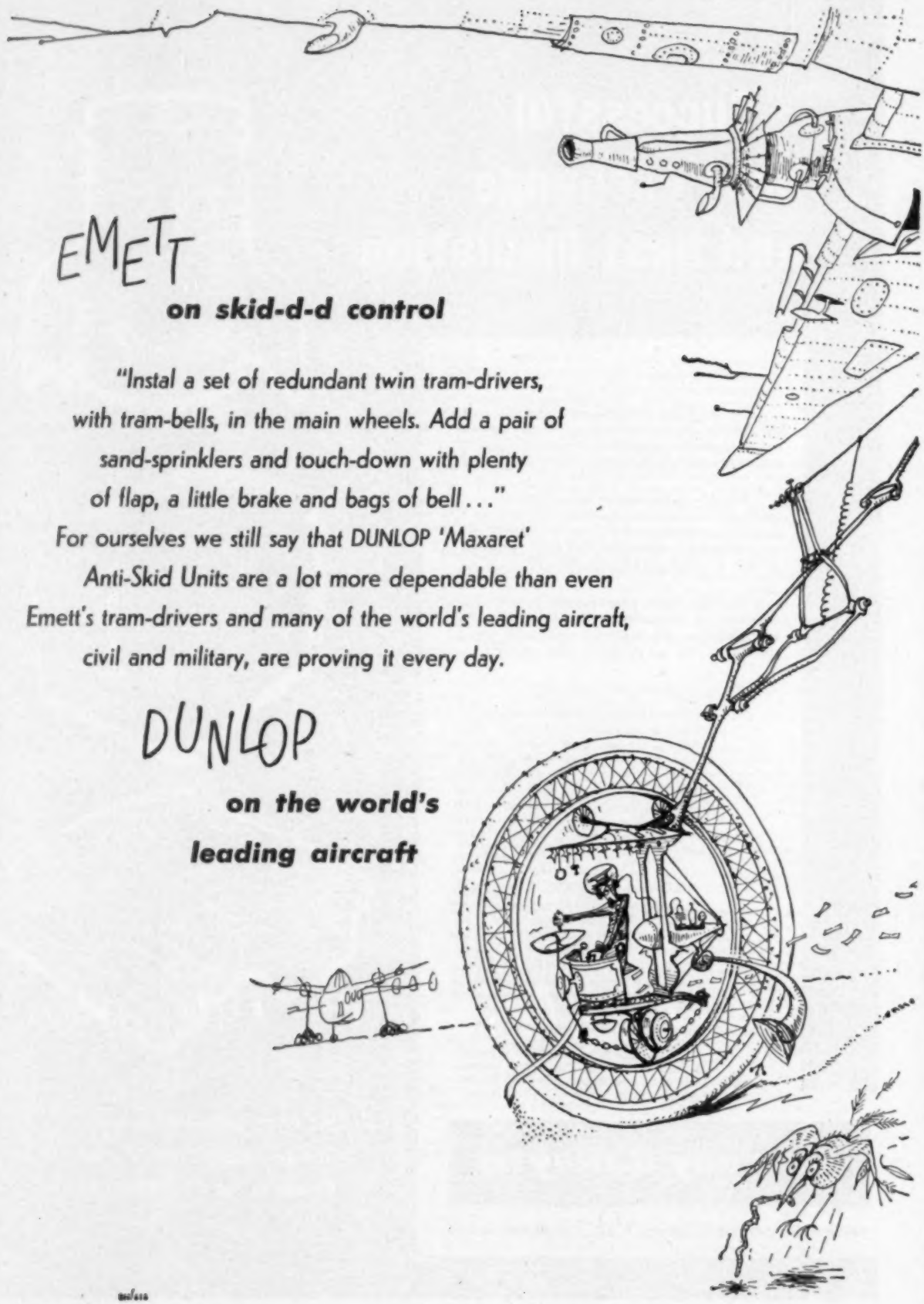

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POD
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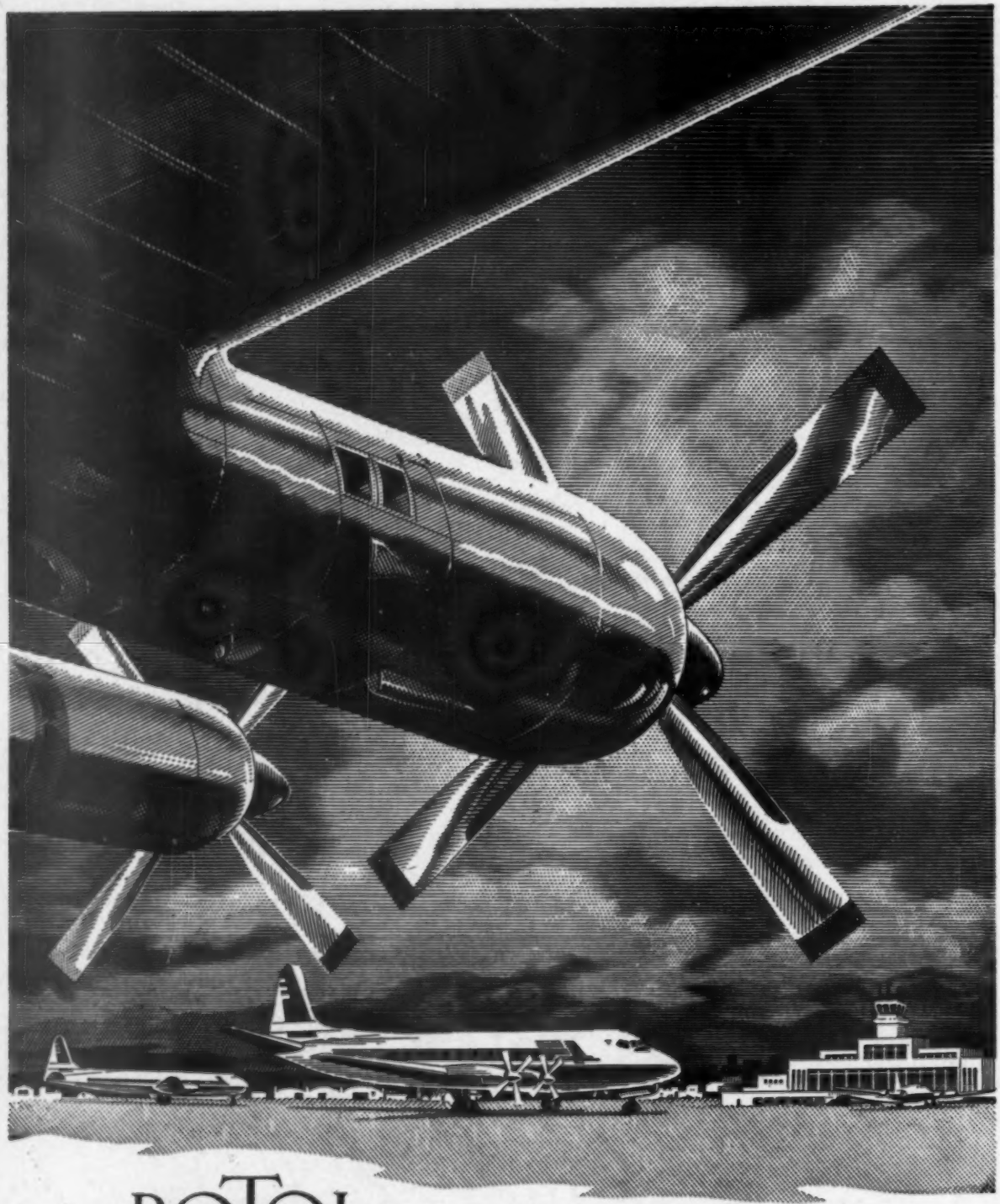


ROTOL PROPELLERS AND GEARBOXES
ARE FITTED TO ALL TYPES OF
ROLLS ROYCE DART ENGINES

Straight and Level

SCRUGGS Aircraft have just revealed amazing new plans "to wrest the airline markets of the world from the Americans." The chairman, Sir John Blackout-Jones, lists the following main points of what he calls his "Steamroller Plan."

(1) All existing airline piston equipment will be bought by Scruggs cash down, at "mutually agreed" prices, which will be not less than double the original purchase price. (2) Scruggs cannot, for "economic reasons," undertake to dispose of this bought-back equipment, so the company will provide steamrollers with fully qualified crews for the necessary demolition work at the customer's base. (3) Fleets of Scruggs S.A.9 Profitliners and S.A.10 Speedmasters can be bought with "no financial liability whatsoever" upon the customer; all deals will be *completely financed by Scruggs*.

Sir John Blackout-Jones is "very hopeful indeed" of a response to his plan, which "permits airlines to acquire as much new equipment as they like without having to part with a penny."

Asked whether the new scheme meant nothing more than that Scruggs were giving aircraft away, Sir John retorted: "Rubbish. You're thinking of the Americans. Scruggs are in business to make money."

● You may not know this, but in the good old days the Press tent at Farnborough used to be a relaxed, pleasant sort of place. Tucked away in one corner was a table where information handouts could be left in peace. Then a few company P.R.O.s had the bright idea of setting up shop *inside the tent* and of dispensing material from their own light-oak emplacements.

This year things got a little out of control. Before reaching the Press tent proper one had to pass through a gloomy ante-chamber strewn with hazardous obstacles in the form of company stands and information racks, with P.R.O.s lying in wait behind each pile of glossy brochures to ambush the unwary journalist. An occupational hazard, but more civilized than the jungle days when it was the ravening journalists who stalked the timid P.R.O.s.

● "The people of Wales want air services," insists Mr. R. G. Robinson, member of the Welsh Advisory Council for Civil Aviation.

Imagine the hustle and bustle at Cardiff International Airport as leek-garlanded Comets, Britannias and Viscounts touch down and take-off every few minutes. How bravely the red dragon of Wales flutters from their canopies, how exalted are the strains of *Land of My Fathers* issuing from the Dai Jones Building, where massed choirs of miners sing out their proud Gaelic hearts 24 hours a day. And always at the right place at the right moment, wearing their chains of office and plumed tricorns, are the civic dignitaries.

There would be just one small snag—no passengers.

The people of Wales may want B.E.A.-Cambrian air services, but are they prepared to use them? If they are, they can have them. It is as simple as that, look you.

● "The commercial jet age has been introduced by Juan Terry Trippe, the boss of mighty Pan American World Airways, and by Boeing and Douglas." —*Interavia.*

Say, doesn't the General know that smoking near airplanes is strictly forbidden? That KC-135, which he has just flown from Tokyo to Washington, might go off with a BANG! On second thoughts, it just wouldn't dare. You see, the General is Curtis E. Lemay, awesome creator of Strategic Air Command.

● Just to be different, the Russians call their Bedstead (among other things) "The Flying Table." This seems a fair title, especially in view of the fact that it has four of the finest castor wheels that ever graced an old-fashioned piece of furniture. You know the sort: they look as if they're made of cast iron, and have four circular holes for lightness. But so what? The Russians persist in using antiquated hardware, even in their Sputniks, but the stuff works.

● Sir Archibald Jogtrotter, chairman of Turboprop Investments (East Wigan), Ltd., announced last week the formation of the Friends of the Turboprop League. At a news conference in London Sir Archibald explained the aims and purposes of the new association.

"Our aim," he said, "is the complete abolition of the jet transport." Though he realized that this objective would be "somewhat difficult," he counted on strong support for the measures he was proposing to take. These were (1) the sabotage of all runway construction-work, e.g., by dynamiting concrete-mixing machines, etc.; (2) the "persuasion" of ticket-agents to put a 100 per cent surcharge on all jet tickets, the proceeds to be shared equally between the ticket-agent and the F.T.L.; (3) the education of airport residents in the technique of "anguished mass telephone protests" against jet noise.

Sir Archibald concluded by appealing for what he called "acceptance of the basic human right" to turboprop travel. Unfortunately, however, his impassioned words were choked by water-methanol smoke issuing from a canister thrown through the window by Sir Charles Boost, who was in the street outside playing a gramophone record of a J57 running at full power.

● As far as the R.A.F. is concerned, kid gloves are out. The Air Ministry *News Letter* for October 3 says they have been replaced by white nylon ones "for wear with Nos. 1, 1a and 6a dress by officers when carrying swords."

That was certainly a no-kid-gloves remark at Sheffield on September 8 by the Chief of the Air Staff, who was quoted as saying: "I am confident we could destroy Russia tomorrow." Unfortunately he didn't say (so far as my information goes) we could lick the pants off the Russians, so I can't press the sartorial metaphor too far.

● The story goes that when the Comet 4 had completed its noise-acceptance tests at New York, an observer from the local ratepayers' association said to a nearby D.H. man: "Boy, if that's a jet, they can throw away all those piston ships."

● For most people airline travel is still something new, exciting, done rarely. The majority of I.A.T.A. passengers actually pay their own fares—amazing as that may seem—and are not company directors, diplomats or film stars, but mere people. To them, it would be just as hard to part with £234 as it would be to find £235 10s; and for this extra thirty bob could all carriers please make sure that all passengers really are looked after, fussed over, made welcome and never, never, left at a loose end worrying what's going to happen next?

"Air travel must be like bus travel" is a sound slogan; but when Mr. and Mrs. Everyman are spending at 50 times their usual rate they will appreciate considerate conductors.

● "An air hostess is a young lady who asks you what you want and then quickly straps you down so that you can't have it."

ROGER BACON

The Jones KL 66 crane loads a Rolls-Royce Conway engine outside the static show at Farnborough (see "Efficient Lifting," col. 2).

THE INDUSTRY

Fairey Developments in Australia

PRODUCTION has recently begun at the special projects division of the Fairey Aviation Company of Australasia, Ltd., at Salisbury of the W.R.E. Mk 1 camera for the Jindivik target aircraft. A remarkable feature of this unit is that its field of view is more than 180 deg. This project has followed the division's work on the installation, repair and manufacture of control and engagement equipment for Meteor target aircraft, and the manufacture of transponders, missile tracking systems and gyros for Meteors and Jindiviks.

At Bankstown, the company's aircraft division has recently switched the emphasis of its work from R.A.N. Sea Fury and Firefly aircraft to Gannets. These machines are being modernized following long spells of duty in tropical regions, and another current project is the assembly of target Meteors for the R.A.A.F. In the civil field, recent work has included the conversion of a DC-3 for photography and of three Lodestars for agriculture.

New Simmonds Factory

PLANS are announced by Simmonds Aerocessories Pty., Ltd. (Australian subsidiary of Simmonds Aerocessories, Ltd.), for a new factory and administrative building on a site near the company's present works in the Guncotton Area of Ballarat, Victoria. Mr. J. Hanford Stevens, managing director of the Australian company, has stated that there is an increasing demand throughout Australia for the company's products, which include Spire speed fastenings, self-locking nuts, Surform hand tools and a range of fluid-handling instruments.

Architects for the new building are L. H. Vernon and Associates, and work is to be started immediately. Simmonds Aerocessories Pty., Ltd. (P.O. Box 198, Ballarat, Victoria), is a member of the Firth-Cleveland Group.

Sperry Appointment

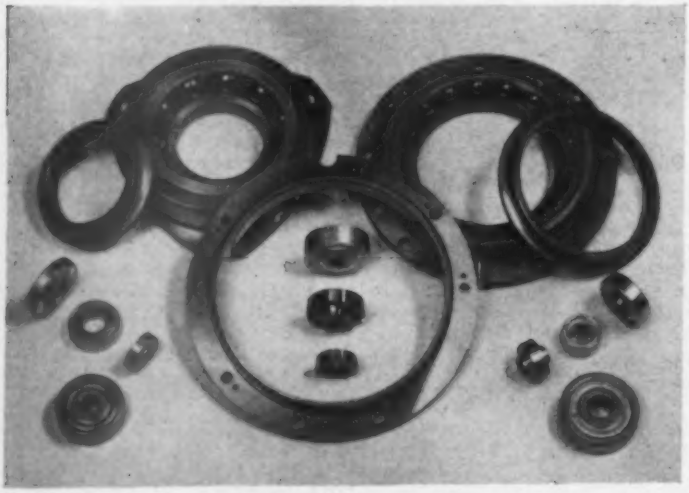
FORMERLY deputy purchasing controller of B.O.A.C., Mr. F. A. Roberts joined the Sperry Gyroscope Co., Ltd., as contracts manager (Bracknell division) on October 1.

Mr. Roberts, who has had a lifelong connection with aviation, joined B.O.A.C. in 1949 as contracts superintendent (engineering). He had previously held temporary appointments with Flight Refuelling, Ltd., and B.E.A. and his earlier experience has included service with the R.A.F. (which he left in 1930 to join the Civil Aviation Dept. of the Government of Tanganyika), the Air Ministry, M.A.P., M.o.S., and Aerlinte Eireann.

Forty Years' Service to the Industry

BEARINGS produced by the Hoffman Manufacturing Co., Ltd., of Chelmsford, Essex, for the aircraft industry are described and illustrated in the company's aircraft catalogue No. AeC 3. This includes a standard range of officially approved bearings and covers most of the sizes and types required for normal applications, but particulars of certain additional sizes are to be found in the general catalogue No. LC 13. For over 40 years the company has produced bearings for the aircraft industry, both to their own and to manufacturers' designs. A selection of contrasting types and sizes of ball bearings is illustrated below.

Aircraft ball bearings from the Hoffman range, referred to above.



Efficient Lifting

SEEN in the illustration above is a Jones KL 66 mobile crane which handled over 90 tons of equipment during the assembly and dismantling periods of the S.B.A.C. Show. Many of the heavier exhibits were handled by this six-ton-capacity crane.

Also in attendance, stationed near the runway, was a Jones KL 10-10 "Fast Travel" mobile crane (illustrated on p. 512 last week) for use in the event of a crash. This particular model, which can cruise at up to 30 m.p.h., has a single engine which powers both the lorry and the crane. Normal capacity is 10 tons, but by the use of a pair of sheer legs, positioned under the jib, a load of up to 20 tons can be raised—e.g., when a complete aircraft has to be lifted on to a trailer. Fortunately the KL 10-10 had no emergency duties to perform, but it played its part in the erection and dismantling of the Show, notably in the lifting of the big Marconi and Cossor radar scanners.

Jones cranes are designed and manufactured by K and L Steelfounders and Engineers, Ltd., of Letchworth, Herts, and are distributed and serviced by George Cohen, Sons and Co., Ltd., of London, W.12. Both companies are members of the "600" Group.

IN BRIEF

Cdr. H. Pasley-Tyler, R.N.(Ret.), has been appointed a director of Elliott Bros. (London), Ltd. He is at present a joint general manager of the company.

* * *

Brown Brothers (Aircraft), Ltd., of Northampton, have opened a branch at London Airport. Its address is Viscount Way, Hatton Cross, London Airport, Middx, and a comprehensive stock of B.S., A.G.S. and S.B.A.C. parts are carried. Mr. A. Davis is manager.

* * *

Irving Air Chute of Great Britain, Ltd., announce that A. Cdre. C. L. Dann, C.B.E., B.Sc., F.R.Ae.S., has been appointed to their Board. A. Cdre. Dann, who joined the company a year ago on retirement from the R.A.F.—in which he held a series of responsible posts, mainly of a technical nature—has until now been their director of technical development.

* * *

The Guest Keen and Nettlefolds group has set up a central advisory service. Known as the G.K.N. Group Export Services Organization (G.E.S.O.), it will co-ordinate activities, such as market research, in the export field and will also provide a central bureau for liaison between the 86 companies of the group. Its offices will be at Shell-Mex House, London, W.C.2.

* * *

Saunders Valve Co., Ltd., announce that W/C. W. G. Brinn, D.F.C., D.F.M., has joined them in the newly created post of service liaison engineer. W/C. Brinn, who recently retired from the Service after 30 years in the Technical and General Duties Branches, will be responsible for looking after Saunders products in the hands of users and will also control preparation of technical publications and the supply of spares.

Mr. P. W. Faulkner, O.B.E., general manager of the chemical and metallurgical division of the Plessey Co., Ltd., since 1953, has been appointed a director and general manager of Plessey International, Ltd.

* * *

On September 30 Helicopter Sales, Ltd., moved into new offices at 2 Lowndes Street, London, S.W.1 (Belgravia 6477). W/C. A. R. Collins, who left the R.A.F. in 1955 and has been an aeronautical sales consultant, has joined the company.

* * *

Mr. John Parsons has resigned his appointment as assistant general works manager of Rolls-Royce, Ltd., Derby, to join the Board of Richard Lloyd, Ltd., Birmingham and Tenbury Wells, manufacturers of Galtona O.K. serrated-blade cutters.

In these new telescopic airliner-stairs extensive use is made of Noral aluminium alloy sheet and sections, supplied by the Northern Aluminium Co., Ltd. The stairs are manufactured by Spurling Motor Bodies, Ltd., of The Hyde, London, N.W.9.

Appointed technical representative of D. Napier and Son, Ltd., for an area which includes India, West and East Pakistan, Ceylon and the Persian Gulf, Mr. Neville White, M.A., A.M.I.Mar.E., will have an office in Bombay and be primarily responsible for Deltic diesel engine and turbo-blower sales, service and overhaul, but will also maintain an interest in the company's aero engine activities in his new territories.

King Aircraft Corporation of Hillington, Glasgow, S.W.2, have issued technical data on an extensive new range of swaged control-rod units.

* * *

The Goodyear Tyre and Rubber Co. (Gt. Britain), Ltd., announces the appointment of Mr. H. A. Brundage as financial director and secretary in succession to Mr. D. Gow, who has retired. Mr. Brundage joined the organization in 1941 and worked in America until 1946. He subsequently served in South Africa, then as financial director of Goodyear-Luxembourg, secretary-treasurer of Goodyear-Sweden and latterly as European manager of the Goodyear International comptroller's division.

* * *

We regret to learn of the death of Mr. Frederick Osgood Hickling, technical manager of Ransome and Marles Bearing Co. for the past 30 years.

* * *

Mr. K. W. King, A.M.Brit.I.R.E., has resigned from the Board of Cossor Radio and Television, Ltd., to join the Decca Navigator Co., Ltd. He will be concerned with the development of navigational systems, particularly in overseas territories.

* * *

Texas Instruments, Ltd., have issued a finely illustrated brochure on their parent company's factory at Dallas, Texas. Similar structural principles are being used for the new 240,000 sq ft factory which they are erecting at Hoo Farm, Bedford, for the manufacture of semiconductor products.

* * *

Mr. W. L. Baker, manager of the metal finishing division of the Pyrene Co., Ltd., retired on September 1 after 30 years' service with the company. He is succeeded by Mr. H. A. Holden, M.Sc., A.R.C.S., D.I.C., A.I.M., who has had many years' experience in the division. Mr. H. F. Parshall, M.A., T.D., who has been with the company for some twenty years, continues as director in charge of the division.

Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. The names and addresses of the writers, not for publication in detail, must in all cases accompany letters.

Hauled-down Helicopters?

WATCHING Farnborough's impressive Rotodyne demonstrations I was led to consider the advantages of landing such machines by mooring lines and a winch. At present the pilot has to juggle with the vertical power from the machine so that it nearly cancels the total downward forces (gravity plus gust components).

If, instead, a line was dropped onto a bollard, the engine put to maximum lift, and the winch used to pull the craft down, a very controlled gust-free descent would be accomplished. Direct control of the difference is always superior to indirect control by fighting the extraneous forces.

Byfleet, Surrey. CYBERNETICIST.

THE Sikorsky company is developing a device by means of which a helicopter can be controlled from the ground, using a tethering cable, in conjunction with the autopilot. A modification of such a device would seem to offer a simple means of ground guidance for a helicopter landing blind.

As the pilot approaches the "heliport," using either Decca or G.C.A., he would lower a cable from a point directly below the single rotor, for example, using a winch. At the end of the cable would be a hook with a weak-link release, and a flashing light or warning horn. The hook could be caught (after earthing) by a man on the ground, in radio contact with the pilot by walkie-talkie, and secured over a ground ring. The pilot could then winch himself down under power, or descend normally, using a constant-torque winch. The former method would be better, providing more rotor control, and being further from the vortex-ring state.

In these simple cases the forces transmitted to the helicopter are direct components of the cable tension, acting, for example, on an eye. At its most complex, an electronic detector of these tensions could be used, providing an input to the autopilot which would tend to keep the craft over the ground ring. This is more or less the Sikorsky device, except that in the latter a height lock is used, the instrument not being intended for landing.

In the simplest case above, no extra electronics are necessary. The length of rope extended forms an exact height guide. In case of emergency the pilot could break the weak link by climbing; or, at worst, he could cut the cable.

Unless I am, in ignorance, short-circuiting some principles of mechanics or helicopter aerodynamics the device seems simple and safe. It should permit use of a heliport little greater than the rotor area—much smaller than at present envisaged.

Halebarns, Cheshire. A. B. KNIGHT.

Falkland Islands Aviation

I AM sure the entry of your publication into the field of international political arguments was made quite unwittingly, but for the benefit of some of your readers who may be unaware of the territorial claims prevailing off the southern tip of the South American continent, I feel I must point out to you that on page 417 of your issue of September 5, you show the British Crown Colony of the Falkland Islands as the Islas Malvinas on a sketch-map illustrating an article on the same page.

This is, of course, the Argentinian name for this group, and since that country has for many years refused to recognize British jurisdiction over the islands, it is a point of honour in the Argentine never to refer to the group by the British name. Indeed, until the collapse of the Peron dictatorship, they were for a time known in the Argentine as the Islas Eva Peron.

This political disagreement over the ownership of the islands has made external communications by sea and air with this outpost of the Commonwealth a great deal more difficult than they need to be, since it has denied the colony the use of the sea and airports on the neighbouring Argentine coastline. In consequence ships and aircraft visiting the Falkland Islands must make the long haul to ports in Uruguay or southern Chile.

So far as aviation is concerned, only three aircraft have made external flights to the Colony so far. The first was a Hythe flying boat of Aquila Airways on charter to the Falkland Islands Co. This (I believe) was early in 1952. Since then two Canso amphibians of Hunting Aerial Surveys have made the return flight to and from Montevideo twice each during the very successful Falkland Islands Dependencies Aerial Survey Expedition. During

Having recently seen an earlier reference ("Flight," April 11, 1958) to Dornier designs in the inter-war years, Dornier-Werke G.m.b.H. have provided this photograph of a neat cantilever-wing type, the Do.H Falke (300 h.p. Hispano-Suiza) which they produced in 1922. Three years earlier they had built a cantilever-wing biplane fighter, the Do.I, with 185 h.p. B.M.W. engine.

CORRESPONDENCE . . .

their visit to the islands these two aircraft completed the photographic coverage of the entire group.

Internally, aviation has been far more active, starting with a seaplane from the French training cruiser *Jeanne D'Arc* prior to the war. During the war years the Royal Navy operated Walrus amphibians, and I have heard (but cannot confirm) that the reconnaissance aircraft from the German pocket battleship *Graf Spee* also flew over the islands—without landing, however.

Since the war the Falkland Islands Government has introduced a very successful internal air service, using this for medical, mail and passenger flights, linking up the outlying farming communities with the capital, Port Stanley. For this three Austers, either on wheels or floats, a Norseman V seaplane, and most recently three Beaver seaplanes have been used. In recent years the Royal Navy has also carried out a considerable number of local flights with helicopters, notably Whirlwinds from H.M.S. *Protector*. A Bell 47 operated by Autair also made a brief appearance over Port Stanley when the survey vessel *Oluf Sven* visited that port.

In the aviation field, therefore, it can be safely said that the effort in the islands has been almost exclusively British, and may I therefore ask you on behalf of all of us interested in this little territory to give it its correct (British) name, please, should you ever have to refer to it again?

Staverton Aerodrome, Glos. JOHN BUCKLE,
Formerly Director of
Civil Aviation, Falkland Islands.

B.O.A.C.'s Balance Sheet

YOU state in your editorial footnote to Mr. Ogilvy's letter [August 29] that though Air India employs over 500 employees per aircraft they still make a profit. May I point out that the pay of the average Indian employee is far below that of his British contemporary? In this argument we are not dealing with the number of employees but the cost of their pay. If B.O.A.C. cut down on employees there would be (a) union trouble, which would lead to (b) a pay increase to the remaining employees—which would put us at the bottom of the ladder again. Any labour trouble in a major airline is bad for business.

Wembley, Middlesex. H. GINSBERG.

Purple Patch

THANK you for your enthusiasm in the description [Farnborough report, September 5] of the interior of the Vickers-Armstrongs Viscount 812. I would like to point out, however, that the purple floor described in your article was a material used by Vickers for the public display of the aircraft; it was not part of the interior designed by Charles Butler Associates for Continental Airlines.

London, W.1. ROBERT J. PRICE,
General Manager, Charles Butler Associates.

Pioneer Aerobatics

ONE wonders who are Mr. Gibbs-Smith's "French authorities" ("Pioneer Aerobatics", Correspondence, September 5) that regretfully accept Nesterov's looping priority. *Les Ailes* of April 12 describes an electronic question-answerer (Larousse-electronique) at the Brussels exposition which gives to the question "A qui doit-on l'acrobatie aérienne?" the reply "Capitaine Aubry 4 Mars, 1913." *Les Ailes* goes on to say that they had always believed the first to be Nesterov, a few days before Pégoud on September 1. The journal then remarks that for their money Pégoud is the man, since his loop was in public and was announced in advance.

Les Ailes returns to the subject on May 31, when it gives the full text of the reply of Larousse-electronique, which attributes to Aubry an *involuntary* aerobatic. It then repeats the statement about Pégoud's public and deliberate stunt, saying that when it was over it was revealed that Nesterov had ante-dated him by some *weeks* (not a few days as previously stated). Nesterov first performed his aerobatic by accident and then repeated it deliberately.

But I would still like to know who are C. H. G-S's "authorities".

London, W.1. BELTANE.

I WELL remember M. Chanteloup's first loops. They were made on a Caudron biplane. But this was long after Adolphe Pégoud had looped and bunted. At the time of Pégoud's inverted flight—and he bunted before he looped—one or two others including a Russian pilot claimed to have already looped. But wasn't it remarkable they had kept so silent about such epoch-making events and there was no reference to them in the Press? I've little doubt that Pégoud was the first to loop. I devote a chapter to this in my *Fifty Years Fly-past*.

Incidentally, the term "bunt" was invented by Hubert Broad and had its origin in a rather rude little story in verse current when the C.F.S. team bunted Genet-Moths at the R.A.F. Display about 1927.

London, S.W.5. GEOFFREY DORMAN.

I DO not agree with Mr. John Barron's statement (Correspondence, August 22) regarding the pioneers of aerobatics. M. Chanteloup did not make the first loop in the world, or Pégoud either. As I have just published, in France, a history of aviation, I have had to do a lot of research and to read the principal magazines published in France from 1896 to 1925. I discovered that Adolphe Pégoud, who was a test pilot for Blériot at Buc airfield, near Paris, looped the loop for the first time on September 21, 1913, while flying a Blériot monoplane over Buc. A few days later Chefillard did it on a Farman; then the Belgian pilot Hamouille, who was also test pilot for Blériot; than Hucks, the first British pilot to do it. At the time Chanteloup was a military pilot and he tried as well, but he was nearly court-martialed by the French military authorities. According to the French papers of 1913, Chanteloup must have been No. 6 on the list.

The first one really to loop the loop was a Russian, Lt. Nesterov, of the Russian Imperial Army, who achieved it with a little Nieuport, at Kiev, on August 20, 1913. The Nieuport factory issued a communiqué at the time. Nesterov was in fact the first Kamikaze, for he died in combat at the beginning of the First World War—unarmed, he rammed an Austrian aeroplane.

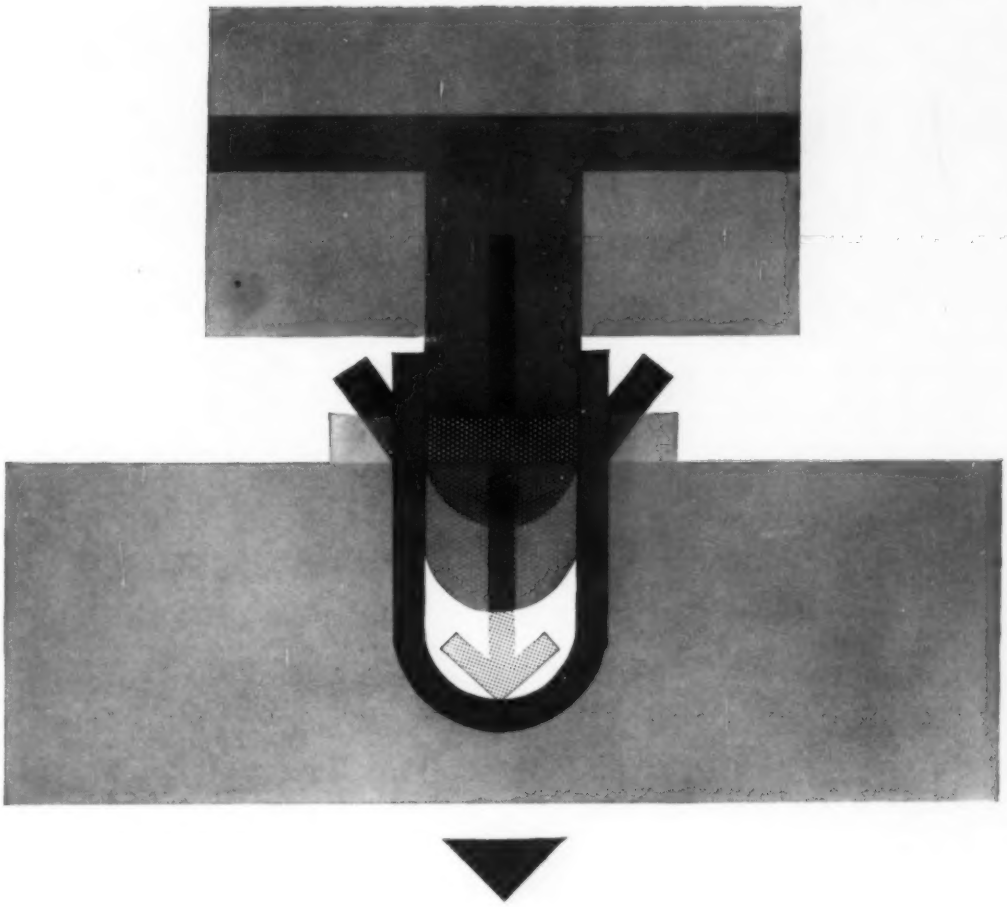
Brussels. VICTOR HOUART,
Major, Belgian Air Force.

FORTHCOMING EVENTS

Oct. 3. Helicopter Association: "All-weather Helicopter Systems," by W. Gerstenberger.
Oct. 7-8. Canadian Aeronautical Institute: Joint I.A.S./C.A.I. Meeting, Ottawa.
Oct. 8. Kronfeld Club: "OSTIV," by Alan Yates.
Oct. 9. R.Ae.S.: The Fourteenth British Commonwealth Lecture, by J. C. Floyd: "Some Aspects of Canadian All-weather Fighter Development."
Oct. 9. Society of Instrument Technology: "Aircraft Flight Simulators," by Dr. A. E. Cutler.
Oct. 10-12. Australian Women Pilots' Association: a.g.m., Sydney.
Oct. 10-11. College of Aeronautics, Cranfield: Open Days.
Oct. 11-12. British Women Pilots' Association: Flying Weekend, Ramsgate.
Oct. 16. R.Ae.S. Graduates' and Students' Section: "The Fatigue of Aircraft," by Major P. L. Teed.
Oct. 16-17. British Interplanetary Society: Space Medicine Symposium and Twenty-fifth Anniversary Dinner.
Oct. 17. Fair Oaks Aero Club: Annual Dinner and Dance.
Oct. 20-29. AGARD meetings, Copenhagen.
Oct. 22. Kronfeld Club: a.g.m.
Oct. 23. British Institution of Radio Engineers (Scottish Section): "Flight Evaluation of Airborne Electronic Equipment," by H. G. Hinkley (at Glasgow).
Oct. 24. British Institution of Radio Engineers (Scottish Section): "Flight Evaluation of Airborne Electronic Equipment," by H. G. Hinkley (at Edinburgh).
Oct. 27. R.Ae.S.: "The Bloodhound," by D. J. Farrar.
Oct. 29. R.Ae.S. Graduates' and Students' Section: Annual Film Show.
Oct. 29. Kronfeld Club: "Aircraft at Leszno, 1958," by Peter Brooks.
Oct. 31. Surrey Flying Club: Annual Dinner and Dance.

R.Ae.S. Branch Fixtures:—Oct. 6, *Henlow*, "Mixed Powerplants," by M. J. Brennon. Oct. 7, *Boscombe Down*, "Propulsion Systems for Space Travel," by A. V. Cleaver. Oct. 8, *Gloucester*, "History of the Supermarine Works," by A. N. Clifton; *Manchester*, "Problems of Supersonic Flight," by L. P. Twiss; *Swindon*, "The Work of the R.A.E.," by M. B. Morgan; *Weybridge*, "Physiological Aspects of High-Performance Flight," by Dr. K. G. Williams. Oct. 13, *Glasgow*, Graduates' and Students' Section, Opening Meeting. Oct. 15, *Bristol*, Presidential Address; *Coventry*, "Digital Computers," by R. F. King. Oct. 20, *Glasgow*, "Propulsion Systems for Helicopters," by Dr. A. W. Morley; *Henlow*, "Guidance and Control," by L. H. Bedford. Oct. 21, *Luton*, "Fatigue Testing of the Fokker Friendship," by E. J. van Beek. Oct. 23, *Bristol*, film show; *Southend*, "Air Safety—Work of the Air Registration Board," by W. Tye. Oct. 29, *Hatfield*, "Recent Developments in Aircraft Casting Manufacture," by R. W. Eade; *London Airport*, brains trust; *Weybridge*, brains trust.

A new way with Pistons



Wilmot Breeden have recently developed a method of cold working (drawing and rolling) shells to close tolerances and high surface finishes. Applied to the quantity production of precision components, formerly machined from bar or forgings, it provides striking economies and high output rates.

If you have an application for this new method we should be pleased to investigate and advise.

The piston illustrated here has a diameter of 1.4". It is cold drawn from sheet steel, and the neck and spherical end are produced by rolling. Surface hardness is 750 VPN. The benefits from this process are a substantial saving in materials and manufacturing time, and freedom for the designer to secure the maximum effectiveness and utilisation of material, through the maintenance of grain flow and structure.

The illustration is by courtesy of Joseph Lucas (Hydraulic and Combustion Equipment) Ltd.

Wilmot Breeden are skilled in metal manipulation

Wilmot Breeden Ltd, Birmingham 1.

Having recently seen an earlier reference ("Flight," April 11, 1958) to Dornier designs in the inter-war years, Dornier-Werke G.m.b.H. have provided this photograph of a neat cantilever-wing type, the Do.H Falke (300 h.p. Hispano-Suiza) which they produced in 1922. Three years earlier they had built a cantilever-wing biplane fighter, the Do.I, with 185 h.p. B.M.W. engine.

CORRESPONDENCE . . .

their visit to the islands these two aircraft completed the photographic coverage of the entire group.

Internally, aviation has been far more active, starting with a seaplane from the French training cruiser *Jeanne D'Arc* prior to the war. During the war years the Royal Navy operated Walrus amphibians, and I have heard (but cannot confirm) that the reconnaissance aircraft from the German pocket battleship *Graf Spee* also flew over the islands—without landing, however.

Since the war the Falkland Islands Government has introduced a very successful internal air service, using this for medical, mail and passenger flights, linking up the outlying farming communities with the capital, Port Stanley. For this three Austers, either on wheels or floats, a Norseman V seaplane, and most recently three Beaver seaplanes have been used. In recent years the Royal Navy has also carried out a considerable number of local flights with helicopters, notably Whirlwinds from H.M.S. *Protector*. A Bell 47 operated by Autair also made a brief appearance over Port Stanley when the survey vessel *Oluf Sven* visited that port.

In the aviation field, therefore, it can be safely said that the effort in the islands has been almost exclusively British, and may I therefore ask you on behalf of all of us interested in this little territory to give it its correct (British) name, please, should you ever have to refer to it again?

Staverton Aerodrome, Glos. JOHN BUCKLE,
Formerly Director of
Civil Aviation, Falkland Islands.

B.O.A.C.'s Balance Sheet

YOU state in your editorial footnote to Mr. Ogilvy's letter [August 29] that though Air India employs over 500 employees per aircraft they still make a profit. May I point out that the pay of the average Indian employee is far below that of his British contemporary? In this argument we are not dealing with the number of employees but the cost of their pay. If B.O.A.C. cut down on employees there would be (a) union trouble, which would lead to (b) a pay increase to the remaining employees—which would put us at the bottom of the ladder again. Any labour trouble in a major airline is bad for business.

Wembley, Middlesex. H. GINSBERG.

Purple Patch

THANK you for your enthusiasm in the description [Farnborough report, September 5] of the interior of the Vickers-Armstrongs Viscount 812. I would like to point out, however, that the purple floor described in your article was a material used by Vickers for the public display of the aircraft; it was not part of the interior designed by Charles Butler Associates for Continental Airlines.

London, W.1. ROBERT J. PRICE,
General Manager, Charles Butler Associates.

Pioneer Aerobatics

ONE wonders who are Mr. Gibbs-Smith's "French authorities" ("Pioneer Aerobatics", Correspondence, September 5) that regretfully accept Nesterov's looping priority. *Les Ailes* of April 12 describes an electronic question-answerer (Larousse-electronique) at the Brussels exposition which gives to the question "A qui doit-on l'acrobatie aérienne?" the reply "Capitaine Aubry 4 Mars, 1913." *Les Ailes* goes on to say that they had always believed the first to be Nesterov, a few days before Pégoud on September 1. The journal then remarks that for their money Pégoud is the man, since his loop was in public and was announced in advance.

Les Ailes returns to the subject on May 31, when it gives the full text of the reply of Larousse-electronique, which attributes to Aubry an *involuntary* aerobatic. It then repeats the statement about Pégoud's public and deliberate stunt, saying that when it was over it was revealed that Nesterov had ante-dated him by some *weeks* (not a few days as previously stated). Nesterov first performed his aerobatic by accident and then repeated it deliberately.

But I would still like to know who are C. H. G-S's "authorities".

London, W.1. BELTANE.

I WELL remember M. Chanteloup's first loops. They were made on a Caudron biplane. But this was long after Adolphe Pégoud had looped and bunted. At the time of Pégoud's inverted flight—and he bunted before he looped—one or two others including a Russian pilot claimed to have already looped. But wasn't it remarkable they had kept so silent about such epoch-making events and there was no reference to them in the Press? I've little doubt that Pégoud was the first to loop. I devote a chapter to this in my *Fifty Years Fly-past*.

Incidentally, the term "bunt" was invented by Hubert Broad and had its origin in a rather rude little story in verse current when the C.F.S. team bunted Genet-Moths at the R.A.F. Display about 1927.

London, S.W.5. GEOFFREY DORMAN.

I DO not agree with Mr. John Barron's statement (Correspondence, August 22) regarding the pioneers of aerobatics. M. Chanteloup did not make the first loop in the world, or Pégoud either. As I have just published, in France, a history of aviation, I have had to do a lot of research and to read the principal magazines published in France from 1896 to 1925. I discovered that Adolphe Pégoud, who was a test pilot for Blériot at Buc airfield, near Paris, looped the loop for the first time on September 21, 1913, while flying a Blériot monoplane over Buc. A few days later Chefillard did it on a Farman; then the Belgian pilot Hamouille, who was also test pilot for Blériot; than Hucks, the first British pilot to do it. At the time Chanteloup was a military pilot and he tried as well, but he was nearly court-martialed by the French military authorities. According to the French papers of 1913, Chanteloup must have been No. 6 on the list.

The first one really to loop the loop was a Russian, Lt. Nesterov, of the Russian Imperial Army, who achieved it with a little Nieuport, at Kiev, on August 20, 1913. The Nieuport factory issued a communiqué at the time. Nesterov was in fact the first Kamikaze, for he died in combat at the beginning of the First World War—unarmed, he rammed an Austrian aeroplane.

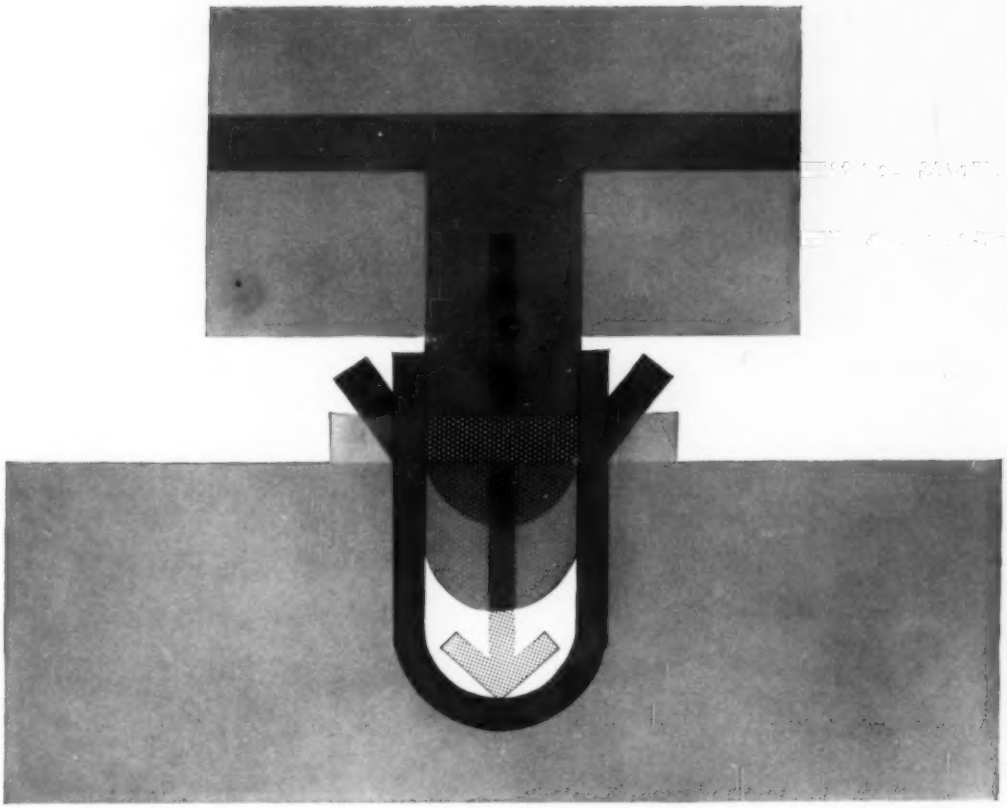
Brussels. VICTOR HOUART,
Major, Belgian Air Force.

FORTHCOMING EVENTS

Oct. 3. Helicopter Association: "All-weather Helicopter Systems," by W. Gerstenberger.
Oct. 7-8. Canadian Aeronautical Institute: Joint I.A.S./C.A.I. Meeting, Ottawa.
Oct. 8. Kronfeld Club: "OSTIV," by Alan Yates.
Oct. 9. R.Ae.S.: The Fourteenth British Commonwealth Lecture, by J. C. Floyd: "Some Aspects of Canadian All-weather Fighter Development."
Oct. 9. Society of Instrument Technology: "Aircraft Flight Simulators," by Dr. A. E. Cutler.
Oct. 10-12. Australian Women Pilots' Association: a.g.m., Sydney.
Oct. 10-11. College of Aeronautics, Cranfield: Open Days.
Oct. 11-12. British Women Pilots' Association: Flying Weekend, Ramsgate.
Oct. 16. R.Ae.S. Graduates' and Students' Section: "The Fatigue of Aircraft," by Major P. L. Teed.
Oct. 16-17. British Interplanetary Society: Space Medicine Symposium and Twenty-fifth Anniversary Dinner.
Oct. 17. Fair Oaks Aero Club: Annual Dinner and Dance.
Oct. 20-29. AGARD meetings, Copenhagen.
Oct. 22. Kronfeld Club: a.g.m.
Oct. 23. British Institution of Radio Engineers (Scottish Section): "Flight Evaluation of Airborne Electronic Equipment," by H. G. Hinkley (at Glasgow).
Oct. 24. British Institution of Radio Engineers (Scottish Section): "Flight Evaluation of Airborne Electronic Equipment," by H. G. Hinkley (at Edinburgh).
Oct. 27. R.Ae.S.: "The Bloodhound," by D. J. Farrar.
Oct. 29. R.Ae.S. Graduates' and Students' Section: Annual Film Show.
Oct. 29. Kronfeld Club: "Aircraft at Leszno, 1958," by Peter Brooks.
Oct. 31. Surrey Flying Club: Annual Dinner and Dance.

R.Ae.S. Branch Fixtures:—Oct. 6, *Henlow*, "Mixed Powerplants," by M. J. Brennan. Oct. 7, *Boscombe Down*, "Propulsion Systems for Space Travel," by A. V. Cleaver. Oct. 8, *Gloucester*, "History of the Supermarine Works," by A. H. Clifton; *Manchester*, "Problems of Supersonic Flight," by L. P. Twiss; *Swindon*, "The Work of the R.A.E.," by M. B. Morgan; *Weybridge*, "Physiological Aspects of High-Performance Flight," by Dr. K. G. Williams. Oct. 13, *Glasgow*, Graduates' and Students' Section, Opening Meeting. Oct. 15, *Bristol*, Presidential Address; *Coventry*, "Digital Computers," by R. F. King. Oct. 20, *Glasgow*, "Propulsion Systems for Helicopters," by Dr. A. W. Morley; *Henlow*, "Guidance and Control," by L. H. Bedford. Oct. 21, *Luton*, "Fatigue Testing of the Fokker Friendship," by E. J. van Beek. Oct. 23, *Bristol*, film show; *Southend*, "Air Safety—Work of the Air Registration Board," by W. Tye. Oct. 29, *Hatfield*, "Recent Developments in Aircraft Casting Manufacture," by R. W. Eade; *London Airport*, brains trust; *Weybridge*, brains trust.

A new way with Pistons



Wilmot Breeden have recently developed a method of cold working (drawing and rolling) shells to close tolerances and high surface finishes. Applied to the quantity production of precision components, formerly machined from bar or forgings, it provides striking economies and high output rates.

If you have an application for this new method we should be pleased to investigate and advise.

The piston illustrated here has a diameter of 1.4". It is cold drawn from sheet steel, and the neck and spherical end are produced by rolling. Surface hardness is 750 VPN. The benefits from this process are a substantial saving in materials and manufacturing time, and freedom for the designer to secure the maximum effectiveness and utilisation of material, through the maintenance of grain flow and structure.

The illustration is by courtesy of Joseph Lucas (Hydraulic and Combustion Equipment) Ltd.

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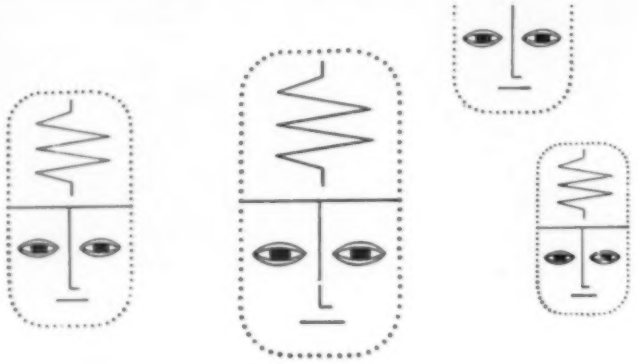

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SERVICE AVIATION

Royal Air Forces and Naval Flying News

Gen. Alfred Gruenther presents the Gruenther Trophy, first prize in the AIRCENT annual reconnaissance competition, to W/C. A. A. J. Sanders (see news-item at foot of col. 1).

No. 807 Sqn. Commissioned

SECOND F.A.A. squadron to be equipped with Scimitars, No. 807 Sqn. was being commissioned at R.N.A.S. Lossiemouth on October 1. Its commanding officer is Lt-Cdr. K. A. Leppard.

Far East Tour

AS part of his plan to get to know the R.A.F. abroad at first hand, the Under-Secretary of State for Air, Mr. C. I. Orr-Ewing, left Northolt on September 25 to visit units of F.E.A.F.

On his outward journey Mr. Orr-Ewing (who made a similar tour of M.E.A.F. in June last year) was to see R.A.F. units at Eastleigh and Aden, and he is to conclude his itinerary by visiting Christmas Island, returning to the U.K. on October 13.

Four-post Command Change

WHAT has been described as a "four-cap" appointment—A.O.C. No. 18 Group, Senior R.A.F. Officer Scotland, ComAir Norlant (NATO) and Commandant of the Scottish A.T.C.—was handed over by A.V-M. P. D. Cracroft to A.V-M. A. D. Selway at R.A.F. Pitreavie on September 22.

A.V-M. Cracroft, who has held these posts since April 1955, is due to retire from the Service on November 29 (his 51st birthday). His successor was formerly commander of the R.A.F. staff at the British Joint Services Mission in the U.S.

Javelin Debut

JAVELINS are making their first appearance in East Africa, two of them being scheduled to give daily displays at the Kenya Royal Agricultural Show, a four-day event being held in Nairobi from October 1 until tomorrow. The aircraft—from Fighter Command's all-weather development squadron at the C.F.E., West Raynham—are due to fly on to Salisbury, Rhodesia, next Monday for a one-day visit to the R.R.A.F. before returning to the U.K.

A Vulcan of No. 83 Sqn. and a Canberra of No. 9 Sqn. are also participating in the Nairobi display, and they will be joined at their temporary overseas base—R.A.F. Eastleigh—by a Beverley of No. 84 Sqn. from R.A.F. Khormaksar, Aden.

Reconnaissance Competition

COMBINED R.A.F. and Belgian and Netherlands Air Force teams from 2nd A.T.A.F. beat combined U.S.A.F. and French Air Force teams by 11,916 pts to 11,218 in the third AIRCENT annual reconnaissance competition, held recently at Spangdahlem in Germany.

The chief award, the Gruenther Trophy, was presented in person by Gen. Alfred M. Gruenther, former Supreme Allied Commander Europe (now retired), to W/C. A. A. J. Sanders, representative of the 2nd A.T.A.F. teams. Individual awards for the high- and low-level contests went respectively to F/O. P. T. Taylor and F/L. A. T. Burt, crew of a Canberra of No. 31 Sqn.; and to Lts. A. Brun and D. E. Saget of the French Air Force, flying F-84Fs, who were first and second in the low-level contest. These awards were presented by Air Chief Marshal Sir George H. Mills, AIRCENT C-in-C., the trophy for the high-level contest having been donated—appropriately enough—by the English Electric Co., Ltd., makers of the Canberra.

The other R.A.F. Canberra crew in the high-level competition—from No. 17 Sqn. (F/L.s Biltcliffe and Radnor)—finished within one point of the winners, with 2,130 pts against 2,131.

Comet Squadron Command

COMMAND of No. 216 Sqn. at R.A.F. Lyneham has recently been taken over by W/C. R. G. Churcher, who had previously commanded R.A.F. Butterworth in Malaya since last January. During the war W/C. Churcher did three operational tours with Bomber Command, winning the D.S.O. and a D.F.C. and Bar, and since the war he has been on staff duties at the Empire Air Navigation School and a flying instructor at the Empire Flying School and the R.A.F. Flying College. While in the Queen's Flight at Benson as a pilot (1951-53) he was decorated with the M.V.O.

Recent Postings

AMONG recent R.A.F. appointments announced by Air Ministry are the following:—

G/C.s C. A. Ball to Air Ministry, for duty in the Department of the Air Member for Personnel; R. K. Cassels to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; P. H. Cribb to R.A.F. Gutersloh, to command; T. J. Hanlon to H.Q., Transport Command, for administrative staff duties; R. D. Williams to R.A.F. Shawbury, to command.

W/C.s E. Baldwin to R.A.F. Wyton, for flying duties; W. D. David to R.A.F. Tangmere, to command; C. R. A. Forsyth to Air Ministry, for duty in the Department of the C.A.S.; D. A. Hine to Air Ministry, for duty in the Department of the C.A.S.; R. Howard to the Department of the Air Member for Supply and Organization, Air Ministry, for duty in the Middle East; G. F. E. Loveridge to Air Ministry, for duty in the Department of the C.A.S.

Battle of Britain Week

IN a B.B.C. *Week's Good Cause* appeal for the R.A.F. Benevolent Fund, the distinguished plastic surgeon Sir Archibald McIndoe said that Battle of Britain Sunday was a day when every Britisher should thank God for 18 years of freedom—"a freedom dearly bought because golden youth wagered health and life in that never-to-be-forgotten gamble which paid the dividends we are spending tonight." Quoting the example of F/L. Richard Hillary, Sir Archibald added: "That gallantry was typical of the young aircrews who gained air supremacy in many theatres of war for six years; and they are still doing it. Some are flying tonight, watching over the Western world's uneasy peace."

Two more of the September 20 displays—see last week's issue—are reported here.

Master airfield and home of two F.T.S.s, a G.W. development squadron and mountain and A.S. rescue services, R.A.F. **Valley** always arranges a full day's programme for the 50,000 Welshmen who normally travel long distances to its "at home." This year a big advance publicity campaign was thwarted by heavy rain in North Wales, and only 25,000 people attended—to be rewarded by a full three-hour flying programme, in brilliant sunshine.

This display was begun by a resident helicopter towing the R.A.F. Standard, then giving a series of varied demonstrations. Instructors put on a polished aerobatic routine in four Vampires, followed by solos in a 5 and a T.11, the pilot of the latter relaying his routine over the P.A. system. G.W.D.S. Swifts made a sensational impression in low runs with re-heat on and Fireflashes under—these weapons also being an outstanding feature of the ground exhibition. The concluding set-piece—before the rain returned at 6 p.m.—was a successful attack on an A.A.-defended fort by rocket-firing Vampires.

At **Turnhouse**, near Edinburgh, 50,000 people watched in fine weather a display whose outstanding item was a finely executed aerobatic demonstration by F/L. D. F. Moffat (an instructor at Cranwell) in a Vampire. There were solo acts also by a Hunter from No. 92 Sqn. (F/L. Martin) and a Scimitar from No. 803 Sqn., F.A.A. (Lt-Cdr. Higgs). Javelins from Leuchars and Hunters from Thornaby also participated, as did a Valiant and a Vulcan; and a charming feature of the display was a "flying musical box"—a Beverley which transported a kilted A.T.C. pipe band to Acklington and Leuchars and back to Turnhouse, at each of which stops they marched out in full musical order.

IN BRIEF

The winter (1958-59) edition of the *R.A.F. Athletic and Games Handbook* is now available from the R.A.F. Sports Board, Air Ministry, London, W.C.1, price 4s.

* * * * *

Led by G/C. V. H. Weeks, Assistant to the Director of Dental Services, twenty-one final-year dental students from London hospitals are to visit Uxbridge and Halton today (October 3) to see something of the work of the R.A.F. Dental Branch. Another twenty-one students will make a similar trip next Friday.

Flanked by a model of Canada's latest aircraft, the Arrow, Avro Aircraft test pilot Jan Zurakowski takes a look at a specially built replica of its earliest, the "Silver Dart." In the latter's cockpit is F/L. J. F. Woodman, R.C.A.F., and to the right one of the replica's builders, L. A/C. L. McCaffery.

CIVIL AVIATION

A news item on p. 567 discusses Air Charter's employment of a Britannia 307. Pictured here for the first time, this aircraft, G-ANCE, is the first Britannia to be operated by a British independent.

JET-AIRLINER LANDMARKS

THE de Havilland Comet 4 and the Boeing 707 have now received their full certificates of airworthiness. The Air Registration Board issued the British jet airliner's certificate on September 29 (see leading article, page 537, and news item on page 538). The Civil Aeronautics Administration issued the American jet's certificate on September 23.

The near-coincidence of these historic dates, an appropriate measure of the intense rivalry existing between the two aircraft, is a reminder of the way in which the development of the Comet 4 and the 707 has been closely parallel over the past four years.

The prototypes, Comet 3 and Boeing 367-80, both flew in July 1954; the first production aircraft were at a comparable stage of assembly for many months until the first 707 drew ahead and flew for the first time on December 20, 1957—11 days ahead of target-date. The first production Comet 4 first took the air on April 27, 1958. The British jet airliner thus took four months less than its American counterpart to qualify for its airworthiness certificate, a discrepancy accounted for by more than 50,000 hr of Comet 1 and Comet 2 experience.

The fact that the Boeing 707 is a considerably more advanced design than the Comet 4 must not be overlooked; nor on the other hand can the greater measure of civil development experience possessed by the Comet. At all events, the first prototypes flew within a few days of each other; and the final production airliners are to enter service four years later within a few days of each other.

EUROPE'S AIR TRAFFIC

AIRPORT statistics for Western Europe provide a useful method of measuring the progress of air transport in a region which is by no means affected uniformly by climatic and economic depressions.

The overall picture is fairly clear: although the number of passengers handled at all Europe's airports has increased by about eight per cent, traffic in Scandinavia, Germany and Switzerland has been expanding much more rapidly, while in Holland, Belgium, France, the U.K. and the Mediterranean countries traffic has been more or less stagnant.

During the first six months of this year London retained its supremacy as Europe's busiest centre for air transport. The total number of passengers stood at 1.5m, an increase of two per cent over last year's figure. Only a small proportion (one per cent) were transit passengers, but the amount of such traffic passing through London dropped sharply by 15 per cent.

Europe's second most important air centre, Paris, experienced an even slower rate of traffic growth than London. At 1.1m the number of passengers during the half-year was only 0.4 per cent higher than in 1957.

Following well behind these two leaders come three airports which each handled rather more than ½m passengers in the first half of this year. Rome has in the past been the largest of the three but the precise figure for this airport is not yet available. It is likely, however, that the Italian capital has been overtaken by both Frankfurt and Copenhagen, these two airports showing increases of 26 and 16 per cent respectively.

The next group comprises three airports at which the half year's traffic amounted to just under ½m passengers each. Berlin remains the largest of these, its traffic increasing by 13 per cent. Amsterdam has previously followed closely behind, but an increase this year of only one per cent has resulted in its being overtaken by Zurich, where passengers increased by nine per cent.

Among the lesser airports, those in Germany and Scandinavia showed average increases of about 12 per cent. Dublin, thanks no doubt to the activities of Aerlinte Eireann, enjoyed a like increase. But the change in passenger traffic at two airports in particular was quite startling: Jersey showed a fall of 10 per cent, while at Basle traffic shot up by 41 per cent. Strangely, these are the only two airports in Europe where non-scheduled traffic is more than one-third of total local traffic.

B.O.A.C IN WEST AFRICA—

LAST Wednesday, October 1, a 15-year agreement came into effect between B.O.A.C. and Nigeria's national airline. This agreement covers the operation of scheduled services by both carriers between Nigeria and the U.K. The Nigerian airline will not acquire long-range aircraft for these services but will charter Stratocruisers and Britannias from the Corporation.

Initially only two round flights a week (one first-class, the other mixed) will be chartered, but the agreement envisages that "the new company shall have parity of frequency with B.O.A.C. on the route within a year after the introduction of the Britannia." (Present plans are that the Stratocruisers will be taken off the route next summer.) Revenue from these services will be pooled.

Although the company's title is "W.A.A.C. (Nigeria) Ltd.," its aircraft will carry the name "Nigerian Airways WAAC." The initials are considered to have acquired considerable goodwill from the airline's predecessor, West African Airways, but it is probable that the company will become known as Nigerian Airways.

As already recorded, the Nigerian Government will be the principal shareholder (51 per cent), the balance being split between Elder Dempster Lines and B.O.A.C. in the proportion two to one. The Corporation's interests in Ghana Airways were discussed in last week's issue of *Flight*.

—AND IN THE WEST INDIES

WHILE expanding their interests in West Africa, the Corporation has recently been seeking ways and means of limiting its responsibilities in the West Indies. The wholly owned subsidiary, B.W.I.A., has been losing heavily of late, the annual deficits ranging between £¼m and £½m. The Corporation's own financial position hardly allows the underwriting of losses of this magnitude, and the deficit being shown for current operations made an appraisal of the present situation imperative.

B.W.I.A.'s chairman, Sir Errol dos Santos, and the airline's general-manager, Mr. John Rahr, have recently concluded discussions with the Corporation. The present difficulties were ascribed to a revenue short-fall resulting from the American recession and the competing attractions of Europe to U.S. tourists since the introduction of economy-class fares across the North Atlantic.

In the circumstances it has been considered necessary to return three B.W.I.A. Viscounts to the Corporation, leaving the Caribbean carrier with a fleet of five Viscounts and three DC-3s. Meanwhile A/C. G. J. Powell is continuing a thorough review into the airline's organization and operations.

A photograph which conveys something of the intensive de Havilland efforts to hasten Comet 4 deliveries to B.O.A.C., who will need three for the inauguration of services in perhaps less than a fortnight's time. It shows the night-shift in action at the Chester factory—which will produce 14 of B.O.A.C.'s 19 Comet 4s—preparing G-APDE for its tests. At the time of going to press four Comet 4s were flying, the type had been awarded its certificate of airworthiness, and delivery to B.O.A.C. of the first aircraft was due last Tuesday morning.

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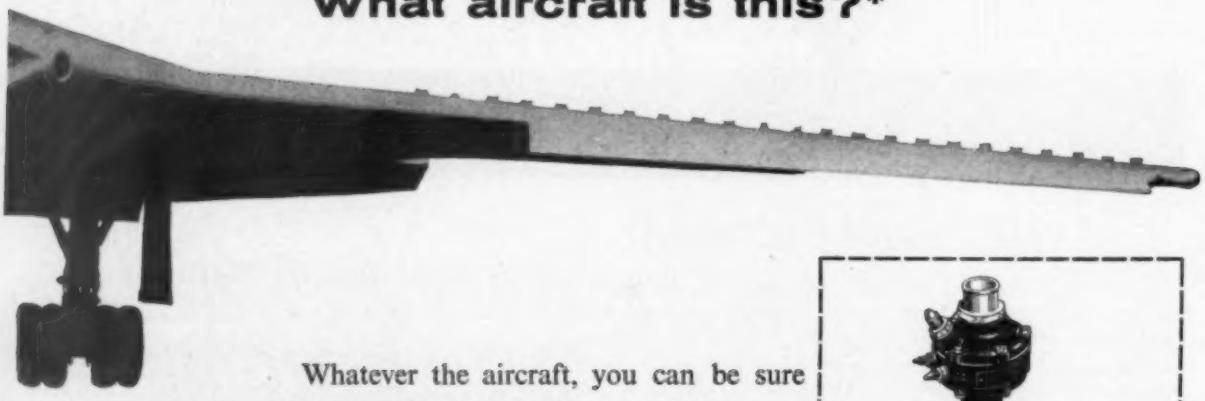

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T.A.C.178

An appropriate illustration to the account (col. 1) of the D.H. Comet 4's final overseas tour is provided by this picture from Vancouver of John Cunningham (centre) with Mr. Grant McConachie, left, president of C.P.A.L., and Mr. Norman Crump, president of C.P.R. The Canadian Air Transport Board's hearings on C.P.A.L.'s application to operate trans-continental services—on which depend a possible order for Comet 4s—are due to begin next Monday, October 6.

CIVIL AVIATION . . .

COMET 4 COMPLETES ITS TRIALS

LAST Saturday evening, September 27, Comet 4 G-APDA returned home to the de Havilland airfield at Hatfield having completed the final 100 hr of route-flying required for its Certificate of Airworthiness. As reported on page 564, this document was issued by the Ministry of Transport and Civil Aviation, on the recommendation of the A.R.B., on Monday, September 29. And as recorded on page 538, the first Comet 4 of B.O.A.C.'s fleet of 19, G-APDB, was formally handed over at a ceremony at London Airport last Tuesday morning.

Last Saturday's homecoming marked the conclusion of the third tour performed by G-APDA to qualify for its 100 hr of route-flying—a qualification which, incidentally, has not before been required for the certification of a British airliner. Each tour was arranged so that the maximum possible virtue could be made out of the necessity of making expensive overseas flights. Thus the first trip to New York and back (16 hr), between August 10 and 12, included noise-measurement tests by the Port of New York Authority. The results of these tests, carried out by de Havilland in the interests of B.O.A.C., is not yet known.

The second flight, to Hong Kong and back (36 hr), coincided with the inauguration of the Colony's new runway, and for good measure the tour included—on the return trip—the longest and fastest flight ever made between sunrise and sunset by a commercial airliner—8,000 miles at 422 m.p.h.

The third and last trip was the most ambitious of all, taking the Comet on a 23,000-mile, 48-hr tour which included Gander, Montreal, Toronto, Ottawa, Vancouver, Mexico City, Lima, Buenos Aires, Rio de Janeiro, Caracas, and New York. At the majority of these ports of call the opportunity was taken to demonstrate the Comet 4's capabilities to local airlines and the Press. Altogether 600 people flew in the aircraft.

At a conference at Hatfield after the Comet's return the de Havilland and B.O.A.C. officials who had been on board seemed agreed that the biggest single impression made by the Comet, particularly in Mexico and in South America, was its modest airfield requirements. The most remarkable illustration was provided at Mexico City. At this airport, 7,340ft in elevation, there was no wind and temperature was about 20 deg above I.S.A. From the 8,200ft runway the Comet easily took-off fully loaded, and flew non-stop the 2,680 st miles to Lima, where it landed with sufficient fuel for 2¼ hr cruising.

At other places, too, the Comet 4 apparently banished the widely held belief that all jet airliners require more concrete. At Lima, 6,200ft, the aircraft showed its ability to accept the unusual conditions which often prevail there because of frequent low cloud, demonstrations including down-wind instrument landings. (This recalls the remark by an Indian airline executive who witnessed a landing at Bombay—in monsoon conditions and landing minima—during the flight to Hong Kong. He commented that it could not have been accomplished by his company's piston-engined airliners.) From Rio's 7,300ft runway the Comet took off at full weight in zero wind in the hot midday sun and passed over the end of the runway at 300ft, already at normal climb power.

On all its flights the aircraft carried B.O.A.C. crews and ground staff under training, and needless to say it could not help breaking flight-time records on every sector.

Asked at Hatfield about the serviceability record, John Cunningham reported that on the third 23,000-mile tour there had been no snag of any kind; all that had been required was fuel and three pints of oil. On previous flights there had been only one minor snag (failure of an electric actuator). The aircraft had also, he said, shown its ability to rely on its own batteries for starting in the absence of ground power supplies. [*Leading article: page 537.*]

AERODROME OWNERS CONFER

AIRPORT and heliport developments in the London area formed the main theme of the 1958 conference of the Aerodrome Owners' Association last week. Included in the programme were visits to London Airport, Gatwick and the site of Westland's new heliport at Battersea.

On Thursday, September 25, the conference was opened at the Hyde Park Hotel by the Mayor of Westminster, after which the chairman of the Association, Mr. Charles M. Newton of Sywell Aerodrome, Ltd., introduced the morning's two speakers. The first was Mr. T. J. Owen, Town Clerk of Nottingham, who gave a concise account of a project for a new East Midlands airport, to be sited either at Castle Donnington or Wymeswold, which would serve the cities of Derby, Leicester and Nottingham.

The second speaker was Mr. Basil Arkell, editor of *World Helicopter*, who talked about the potential development of helicopter transport in this country. After lunch delegates visited Battersea, where work is progressing on the interim river heliport sponsored by Westland Aircraft, and continued to London Airport for a brief tour of the central and maintenance areas.

The following day was spent at Gatwick, where the construction and facilities of the airport were described and tours of inspection were made.

NO MORE FLYING-BOATS

THE end of September saw the passing of an era in British air transport—that of commercial operation of flying-boats. Last Tuesday evening an Aquila Airways Solent returned to Southampton Marine Berth 50, having completed the airline's—and Britain's—last flying-boat service.

Aquila Airways was formed in May 1948 by Mr. Barry Aikman and in the following May started a regular service, using Hythes, between Southampton and Madeira via Lisbon. Five Solents were subsequently acquired and the network was expanded to include Las Palmas, Marseilles and Capri. In 1955 the system was further expanded to cover more points in the Mediterranean, and the following year traffic increased to the record figure of 16,500 passengers. Also in 1956 Aquila became a member of the British Aviation Services Group.

Last year saw a further slight rise in traffic but was marred by the disaster involving a Solent at the Isle of Wight.

Services this year were reduced to a twice-weekly flight to Madeira and an inclusive tour to Majorca, a twice-weekly shuttle service Madeira - Lisbon being operated in conjunction with the U.K. - Madeira service. In July the chairman of B.A.S., Mr. Eoin Mekie, announced that Aquila's flying-boat operations would cease on October 1. The main reason for this decision was that these services were no longer economic to operate, the airline having recently faced a deterioration in load-factors; abnormal swell conditions at Funchal also brought difficulties.

Aquila's present fleet of three Solents is being sold abroad. Although air services between the U.K. and Madeira have now come to an end, the island has not been entirely removed from the air map of the world. A newly formed Portuguese company, Artop, has acquired flying-boats and was due to take over the Lisbon - Madeira service on October 1.

Here is Lufthansa's first Vickers Viscount 810, which flew at Weybridge on September 22. The West German airline has nine on order: other 810 customers whose contracts are now being fulfilled are Continental (in service), V.A.S.P., and S.A.A.

CIVIL AVIATION . . .

JAPANESE EXPANSION PROGRAMME

JAPAN AIR LINES' network at present stretches from Bangkok and Singapore in the west to San Francisco in the east. For some years it has been known that a considerable extension was being planned. The company had set 1966 as the year for establishing round-the-world services, the first step in this direction being extension of the Bangkok service in 1959 to London via Calcutta, Karachi, Beirut, Rome and Paris, the second step being replacement of DC-7Cs by DC-8s early in 1961 on trans-Pacific services, and the final step being the opening of polar or north Atlantic routes to Europe.

J.A.L.'s earlier plans have now been revised. Inauguration of the so-called "southern" route to Europe via South-East Asia and the Middle East has been postponed until 1961. That year should also see J.A.L. start operating a polar route to Europe. But the date for world flights has been brought forward to 1963, the probable route being through Seattle and New York. Other new operations planned by J.A.L. include new Pacific services to Formosa, the Philippines and Latin America, and domestic helicopter services.

J.A.L. plan to become all-jet operators by 1966. Between now and 1960 the piston fleet will probably be augmented by additional DC-4s and DC-7Cs, being brought up to a total strength of six DC-7Cs, five DC-6Bs, and 14 DC-4s. In 1961 the four DC-8s ordered in December 1955 will be placed in operation, and between then and 1966 the entire piston fleet will be sold. Although no further jet orders have yet been announced, the realization of this plan would involve the purchase by 1966 of four additional DC-8s and 28 unnamed turbojets (18 short-range, ten medium-range). The Rotodyne is reported to be under consideration for short-haul internal operations.

The annual output of J.A.L.'s present fleet is of the order of 60m c.t.m. The fleet planned for 1966 should be able to produce 600m c.t.m. annually—a tenfold increase in eight years. It is, no doubt, with this in mind that the airline has qualified its expansion plans with a reminder that the programme depends on approval and financial support being received from the Japanese Government, and on the necessary traffic rights being granted by governments abroad.

AMERICAN AIRLINES' FARES POLICY

HAVING just increased their order for new jet airliners by 50, American Airlines are now pressing for what they term "steps to buttress the economic situation of an airline faced with enormous financial commitments incident to its revolutionary programme."

American are seeking, according to *Aviation Daily*, "tariff revisions" involving (1) reduction of the "family plan" discount; (2) elimination of the round-trip and other discounts; and (3) elimination of free stop-overs. These steps, the airline urges, "are a logical and necessary beginning" to ensure the success of its jet programme. Failure to implement such fare adjustments would, say American, be "imprudent in the extreme."

The airline goes on to say that other measures to "improve the revenue picture" will be necessary, "of course." These measures would include vigorous sales promotion and careful cost control.

As American themselves say, the measures outlined above would be only the first steps in their campaign to increase fares. However, it may well be the C.A.B.'s point of view that the word "imprudent" is more applicable to American's re-equipment programme than to the Board's resistance to increased fares. The C.A.B. appear unlikely to submit to such pressures pending their findings on the General Passenger Fare Investigation, which concluded a few weeks ago with 20,000 pages of evidence submitted during hearings which lasted eight months. In the meantime other domestic carriers, including T.W.A., Delta and United, have filed applications for "tariff adjustments."

On September 24 an air services agreement between the U.K. and Ghana was signed in London by the British Parliamentary Under-Secretary of State for Commonwealth Relations, Mr. C. J. M. Alport, and the Ghanaian High Commissioner, Mr. Edward Asafu-Adjaye

SALVADOR TO SALISBURY

GROWTH and improvement in air transport has been such that it comes as a surprise to learn of an instance where surface vehicles have driven the aeroplane out of business. The post-war disappearance of air services in Salvador is certainly the most interesting example of this phenomenon: improvement in the road system of that Central American state led to the complete abandonment of internal scheduled air services.

A more recent illustration is provided by Central African Airways' decision to withdraw their feeder services in Southern Rhodesia as from the end of October. These are operated by Beavers and follow two routes running northeast from Bulawayo: one to Salisbury via Gwelo, Que Que and Gatooma; the other to Umtali via Shabani and Fort Victoria. The main reason for this cut is given as the improvement in the Bulawayo - Salisbury - Umtali road. C.A.A. have for some years been watching the effect on their traffic of better roads and as far back as 1956 referred to the possibility of withdrawing the Southern Rhodesia Beaver services. The present financial difficulties of the airline were also a factor in deciding to eliminate avoidable losses.

Not all the Southern Rhodesian stations being currently served by C.A.A. Beavers will be denied regular air services, however. It is likely that the Cessna operation of Commercial Air Services (a Rhodesian subsidiary of Airwork, Ltd.), at present limited to a once-weekly flight Bulawayo - Wankie, will be extended.

CUTTING RED TAPE

A RECENT I.C.A.O. report enumerates the various steps that must be taken before the ultimate object of facilitation—"free and unimpeded passage"—can be satisfied. The three main courses of action are given as the simplification and standardization of procedures, amendment of restrictive regulations, and reduction of avoidable ground delays.

The report considers "documentation minima" for each class of traffic. In the case of inbound visitors these are given as identification and vaccination certificates. Health examinations should be restricted to passengers coming from an area afflicted by one of the six quarantinable diseases. Currency examination should also be eliminated as widely as possible. Outbound passengers should normally require no documentation; in particular, exit visas should be finally abolished. Documentary requirements for transit passengers should be withdrawn, arrangements being made at international airports for segregating such traffic and keeping it under general supervision.

Procedures for clearing baggage through Customs should be simplified. All documentation and examinations involving outbound and transit baggage should be completely eliminated.

The widespread practice of accepting crew licences and certificates in lieu of passports or visas should be universally adopted.

Inbound freight should require no more than an adequate commercial invoice and a sanitary certificate where necessary. Separate invoices of origin and value should be eliminated in as many cases as possible. Examination should be limited to the satisfaction of security needs and the determination of Customs duty. Export of freight should involve no documents or fees. A delivery note is the only document required for airmail.

Non-scheduled services overflying a country, or making technical stops only, should not be required to give more advance notice than is necessary for purposes of traffic control and for meeting the requirements of the public authorities. Permission for traffic stops should not be channelled through diplomatic offices and should be prompt, specific, simple and gratis.

Three senior executives of Okanagan Helicopters, Ltd.—the first customer for the Fairey Rotodyne—are seen after having inspected the aircraft. Left to right, Mr. Jack West, Mr. J. C. Charleson and Mr. Glenn W. McPherson, respectively vice-chairman, vice-president and president of Okanagan; and Maj. C. H. Chichester Smith, director of the Fairey Aviation Co., Ltd.

This is a typical page from an excellent new booklet published by BP, showing the décor and insignia of 81 I.A.T.A. airlines. Each drawing, the work of John Stroud, is in full colour, and there are notes about each airline in English, German, French and Spanish. A nine-page appendix is devoted to I.A.T.A. airline statistics. Copies, price 3s. 6d., are obtainable from the Aviation Service of the BP company, Britannic House, Finsbury Circus, London, E.C.2.

A DUBIOUS IMPOSITION

SINCE the Inland Revenue Commissioners sought to tax as income the value of sites overlooking the Coronation procession, few income-tax cases have aroused as much popular interest as the recent attempts to treat concession fares for airline staff as "benefits in kind."

Inland Revenue officials have made it clear that this would apply only to persons earning over £2,000 a year: as far as most airlines are concerned the only employees involved will be senior executives and aircrew.

The immediate relations of B.O.A.C. aircrew can travel (usually on a space-available basis) at 10 per cent of the normal fare. But various conditions apply to other staff in the Corporation and to employees of other airlines. Possibly the most common feature of nearly all these concession schemes is the embarrassment felt by participants who have been "bumped" at some isolated outstation, there having had to wait at considerable expense and inconvenience until a flight came through with sufficient unused space to allow their journey to be completed.

A serious consequence of penalising staff travel would be the likely transfer of senior aircrew to foreign airlines less subject to irritating income tax requirements. To combat such a tendency would necessarily add to the cost of British air services.

AMERICAN v. UNITED

THE competitive struggle between American and United to sell the most air travel is rivalled only by the battle between Chevrolet and Ford as an example of private enterprise in action. An interesting sidelight to this struggle, the latest event in which was American's order for 50 medium-haul jets, is the way that United has managed to catch up its rival traffic-wise. Last year saw American carry slightly over 5m. passenger-miles, a figure that United just failed to reach, but over the first half of this year American's passenger traffic fell by 3 per cent while United's traffic rose by 6 per cent, to bring the two companies almost in line. And in June, United took the lead in total traffic.

Concentrating its attention in the more temperate northern latitudes of the U.S., United traditionally gains on its rival in the second half of the year, and consequently hopes that 1958 will see American pushed into second place. However, few illusions are entertained about what will happen when American's Electras and 707s are put into operation early next year.

PRIVATE-ENTERPRISE BRITANNIA

IT can almost be taken as a sign of maturity on the part of an aircraft to be put on to non-scheduled services. Air Charter, the first independent British operator to employ the Britannia, has already arranged a series of charter flights between London and Christmas Island. These will be carried out on behalf of the Ministry of Defence and involve the transport of personnel (not troops) to the H-bomb tests in the South Pacific.

The total number of flights has not yet been disclosed but four are scheduled to take place in October, the first having been due to leave Stansted on October 1. The 9,400 mile route to Christmas Island passes through Goose Bay, Vancouver and Honolulu. Representing a total utilization of about 200 flying hours, this operation should keep Britannia G-ANCE completely occupied for the whole month. A proving flight to New York took place last week-end, the aircraft being commanded by Capt. E. N. Jennings, the company's chief pilot and operations manager.

UP-TO-DATE WITH EAGLE

EAGLE AIRWAYS, who recently celebrated their tenth anniversary, have two claims to distinction among British privately owned airlines. First, they operate the largest international scheduled service route network of any of the independents. Secondly, they were the first of these carriers to challenge the Corporations—albeit indirectly—with turboprop competition on a dollar-earning route.

Eagle Airways (Bermuda), Ltd., began operations on one of B.O.A.C.'s "plum" routes, New York to Bermuda, on May 1 this year as the Bermudan-designated flag carrier. Once a day Eagle's Viscount 805 *Enterprise*, bearing the Bermudan registration VR-BAX, flies the 763 miles between New York and Bermuda, leaving Idlewild at 1430 and arriving at Kindley Field at 1720. *Enterprise* has accommodation for 42 tourist and 12 first-class passengers, whose needs are catered for by locally recruited stewardesses.

B.W.I.A., the only other turboprop operator on this route, operates four tourist services a week with Viscount 702s and 772s, while B.O.A.C. runs a daily first-class and tourist service with DC-7Cs to Bermuda. Eastern Air Lines operates 17 Super Constellation tourist flights a week on this route (plus a twice-weekly Washington-Bermuda Constellation service) and Pan American 16 flights a week with DC-6Bs and DC-7Cs (plus a thrice-weekly Boston-Bermuda service).

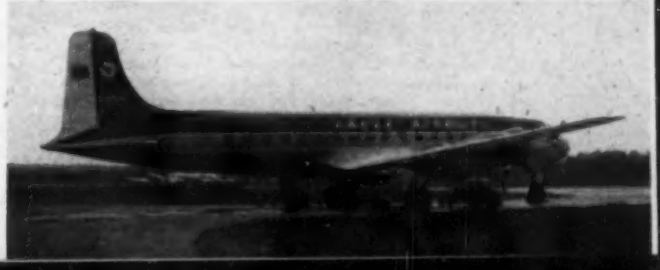
Eagle's Bermudan associate has plans for extending the services to other centres besides New York, and has applied to the C.A.B. to serve Washington and Baltimore. There is also the possibility of a non-stop Bermuda-Montreal Viscount service, and an application has been put forward by the parent Eagle company for a London-Bermuda Colonial-coach service *via* the Azores, going on from Bermuda to Nassau and Jamaica.

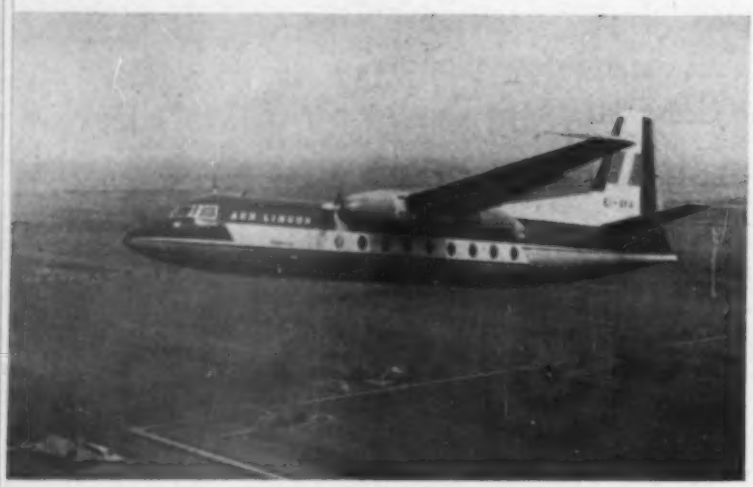
The latest addition to Eagle's fleet of two Viscount 805s and 15 Vikings are two ex-Slick Airways Douglas DC-6As. One of these was purchased from the American carrier before delivery from Douglas, and both are now in service converted to DC-6A/B standard for use on charter and trooping flights. As pure freighters each can carry a maximum payload of 24,500 lb. For the passenger rôle there are 98 rear-facing seats, fitted five-abreast at 34in pitch. The first DC-6A (pictured below) was fitted out by Eagle Aircraft Services and the second was converted in America. These new aircraft will enable Eagle to contemplate selling some of their 15 Vikings.

Of the two Viscounts, one operates the Bermuda service and the other flies on European routes; registered G-APDX, the latter has accommodation for 12 first-class and 40 tourist passengers, and can be fitted with up to 70 passenger seats. Eagle are, incidentally, the only British independent to offer first-class seating. G-APDX flies the Manchester - Hamburg - Copenhagen return service and until recently the Manchester - Brussels - Frankfurt return service (now suspended). There is also a Viscount night-tourist service to Pisa every Saturday from Blackbushe.

It is worth emphasizing that Eagle are unusual among the major British independent airlines in that they are not allied with any other financial, shipping or aviation interests. M. J. H.

Left, one of Eagle's two Viscount 805s, which is used on the New York-Bermuda service. Right, one of the company's two new DC-6As—in the same striking maroon colour-scheme—now being used for trooping and charter work. A third Viscount may be bought next month.





Soon to take delivery of their Fokker Friendships are Aer Lingus, who hope to inaugurate services between Dublin and Paris next month. One of their first aircraft is seen here on test over the Netherlands.

CIVIL AVIATION . . .

NEXT STEPS IN NOISE

WHILE the airports of London, New York and Paris are moving nearer to an agreement on jet-noise standards, further tests are still being undertaken. PanAm's Boeing 707-120 is shortly to revisit London to permit the M.T.C.A. to obtain "data needed to establish the conditions under which the aircraft can be accepted on a regular service into London Airport."

The 707 will operate into London under much the same conditions as apply to the second series of trials at New York Idlewild. These, devised by PanAm, include operating techniques specifically designed to minimize disturbance. At L.A.P. this implies a climb-out path that will prevent the aircraft flying at less than 1,000 to 1,500ft in the vicinity of nearby communities. In contrast to the trials at London Airport on September 8 and 9, when the 707 was operated at 190,000 lb maximum weight, the forthcoming tests will be at the higher weight of 220,000 lb; but once again flights will be made only during waking hours.

The Tu-104 has also been the subject of recent noise analysis. In a recent issue of one Soviet journal a report of the tests quotes noise-levels for the Tu-104 at different maximum weights and in summer and winter temperatures. If the engines are operated at rated power, the report states, the overall noise-level from the start of the take-off run is 115 decibels at 2.5 miles, 109 db at just over four miles and 105 db at five miles, slightly lower values being recorded in low temperatures. It has been found that a reduction to rated cruising power for the climb-out (or a little less during the summer) will reduce the noise level by at least 5 db, and these noise-levels, it is claimed, are comparable with those of such piston-engined transports as the Super Constellation, Stratocruiser or DC-7.

The following operational recommendations have been made for the Tu-104: (1) Take-off should be carried out at a maximum take-off thrust up to 250-280ft and up to an indicated air speed of at least 220 m.p.h.; (2) engines should then be throttled back to rated cruising thrust and climb continued at 248 m.p.h. I.A.S.; (3) at 90 per cent of maximum weight a 12 db noise-reduction is possible over a climb at take-off thrust (the technique here is to throttle back at 250-280ft to 60 per cent rated thrust and climb at a reduced slope and at an I.A.S. of 248 m.p.h.); (4) after the city or town has been passed or when 2,300ft is attained, engines can be re-adjusted to rated cruising power.

In cases where built-up areas are at a distance of more than three miles from the start of take-off, climb may be continued at rated power and engines throttled back only in the immediate vicinity of the town. If altitude at this point already exceeds 2,000ft, climb is continued without throttling back.

BREVITIES

AN important new development of the Lockheed Electra was announced last week. To meet Northwest's non-stop transcontinental-U.S.A. aspirations, internal wing tankage has been increased from 5,506 U.S. gal to 6,406 U.S. gal, increasing range by 25 per cent. Gross weight goes up from 113,000 lb to 116,000 lb —a weight allowed for in the Electra's recent certificate of airworthiness.

* * *

Two Lockheed 1049Hs have been ordered by Flying Tiger. Delivery will take place in 30 days.

* * *

American sources report that PanAm are to send 250 pilots on leave in mid-October, and are to give leave also to 57 flight engineers.

* * *

According to *Aviation Daily*, Lockheed have been re-examining the possibility of converting Super Constellations to Rolls-Royce Tyne turboprop power.

* * *

May 4, 1959, is the date on which Aerolineas Argentinas plans to put the Comet 4 into service between Buenos Aires and New York.

* * *

The four B.O.A.C. Stratocruisers returned to Boeing, as previously recorded, have been sold by the Babb Company to Transocean Air Lines, which is part-owned by Babb.

* * *

PanAm completed 183 hr of flight time on the first 707-120 in the course of proving-flights to Puerto Rico and Europe. The aircraft has been returned to Boeing for minor modifications.

* * *

T.W.A. will first introduce their 707s on U.S. domestic routes. Non-stop operations between New York and San Francisco are planned to start on March 15, with non-stop flights to Los Angeles starting on April 1. United Air Lines' introductory date for the DC-8 non-stop between New York and San Francisco and N.Y. - Los Angeles is September 1, 1959.

It seems likely that Douglas will fly a JT4-powered intercontinental jet airliner before Boeing; the second DC-8, painted in United colours, is due to fly later this month. It will be preceded by the third DC-8, JT3 powered, and also in United colours.

* * *

American Airlines will inaugurate Boeing 707 services between New York and Los Angeles on January 11. The airline is at present seeking C.A.B. approval to compete with T.W.A. and United in operating non-stop to San Francisco also.

* * *

K.L.M.'s first Electra will be delivered in September 1959. The second will follow in November, and two more in December. One per month will be delivered in the first four months of 1960; two in May 1960; and the eleventh and twelfth aircraft in November and December 1960. The Dutch airline will receive its first DC-8s in February 1960, the contract for seven aircraft to be completed by December of that year.

* * *

It is reported that U.S. airlines are considering the possibility of converting DC-7s to Napier Eland turboprop power. It is said that if firm interest is shown in a minimum of 30 conversions, Douglas would carry out a test installation. Estimated cost of conversion might be about $1m; direct operating costs would be reduced from about $545 per hour to $440 per hour, and block speed increased from 300 to 350 m.p.h.

In the news last week because of their "ban" on the Boeing 707 were the Rome airport authorities. Seen here (centre) with a model of the new Rome airport being built at Fiumicino is Sr. Guiseppe Togni, Italian Minister of Public Works. The airport will be ready "for limited operations" next summer, and for full use in 1960.

VICTOR

"At its operational height the Victor can outfly and outmanœuvre any fighter in squadron service to-day."

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IN SQUADRON SERVICE WITH THE R.A.F.

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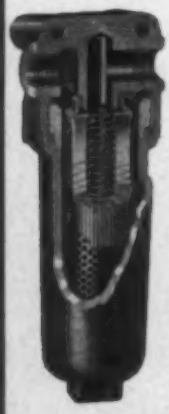

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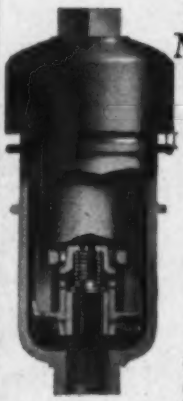

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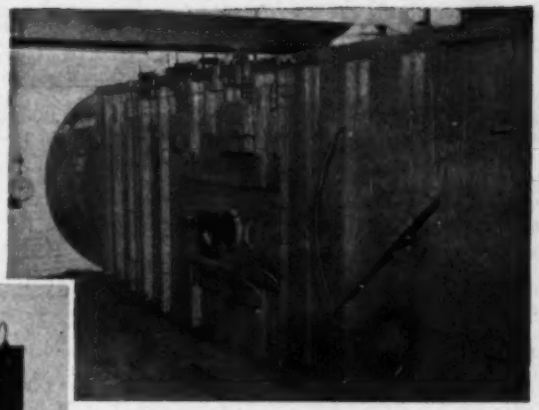

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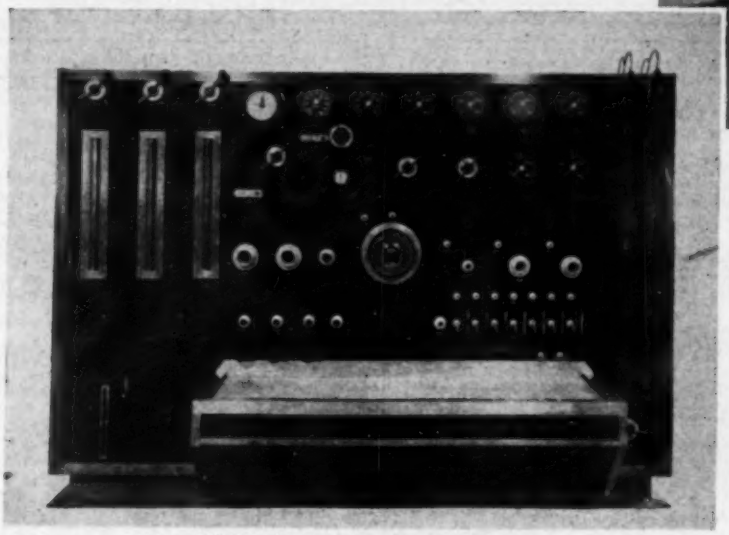

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INDEX TO ADVERTISERS

	Page
Air Ministry, The	34
Armstrong Whitworth Aircraft, Ltd., Sir W. G.	10, 36
Automotive Products Co., Ltd.	30
Avro Aircraft, Ltd.	35
Boeing Airplane Co.	4
Booth and Sons (Bolton), Ltd., John	9
Boulton Paul Aircraft, Ltd.	Cover ii
Box No. 8482	34
B.P. Aviation Service	14
Bristol Siddeley Engines, Ltd.	Facing Edit. Page 542, Cover iv
British Air Line Pilots' Association, The	33
Brown and Tawse Tubes, Ltd.	30
B.S.T. Aeronautical Co., Ltd.	33
Burnley Aircraft Products, Ltd.	3
Cellon, Ltd.	16
Cox Brothers and Co. (Derby), Ltd.	31
Cross Manufacturing Co. (1938), Ltd.	32, 33
Cullum and Co., Ltd., Horace W.	28
Delaney Gallay, Ltd.	21
Desoutter Brothers, Ltd.	Facing Edit. Page 543
D.E.V. Engineering Co., Ltd., The	33
Dunlop Rubber Co., Ltd.	22, 23
Electronic Computer Exhibition	Facing Edit. Page 563
EMI Electronics, Ltd.	Facing Edit. Page 555
English Electric Co., Ltd., The	13, 36
Gordon and Co.	31
Handley Page, Ltd.	29
Harringay Photo Supplies	33
Harvey and Co. (London), Ltd., G. A.	6
Hymatic Engineering Co., Ltd., The	5
International Aeradio, Ltd.	34
Irish Air Charter, Ltd.	33
Latex Upholstery, Ltd.	30
London School of Air Navigation, Ltd.	34
Lucas (Gas Turbine Equipment), Ltd., Joseph	Cover iii
Macdonald and Co. (Publishers), Ltd.	30
Martin-Baker Aircraft Co., Ltd.	Facing Edit Page 551
Newalls Insulation Co., Ltd.	8
Palmer Aero Products, Ltd.	1
Philblack, Ltd.	35
Rolls-Royce, Ltd.	15
Rotol, Ltd.	24
Saunders-Roe, Ltd.	Facing Edit. Page 550
Shackleton, Ltd., W. S.	32
Shell Aviation Service	Facing Edit. Page 554
Sigmund Pumps, Ltd.	7
Teddington Aircraft Controls, Ltd.	28, 34
Texas Instruments, Ltd.	2
Vickers-Armstrongs (Aircraft), Ltd.	27, Cover i
Wilmot Breeden, Ltd.	Facing Edit. Page 562
Z and I Aero Services, Ltd.	33

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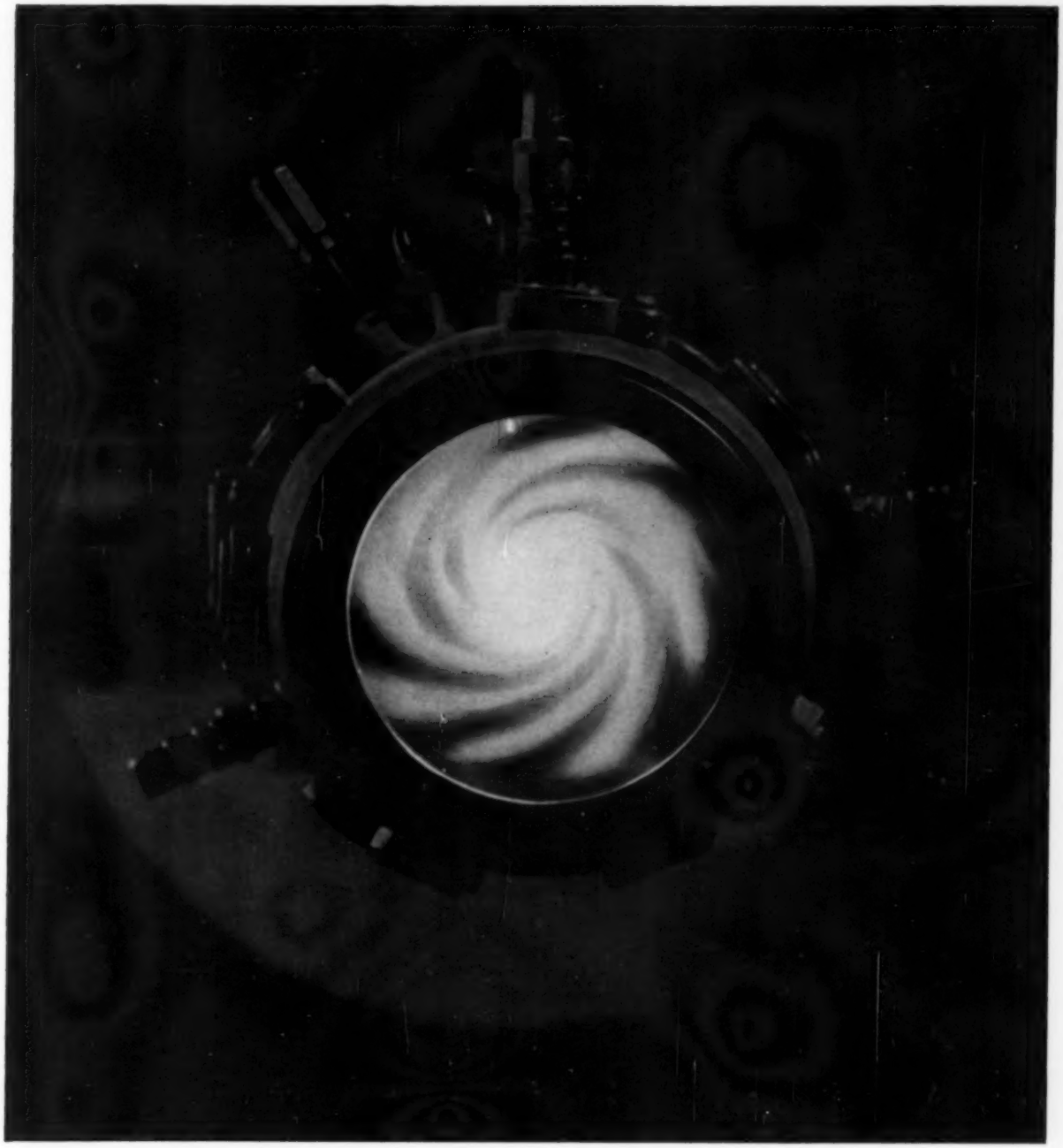

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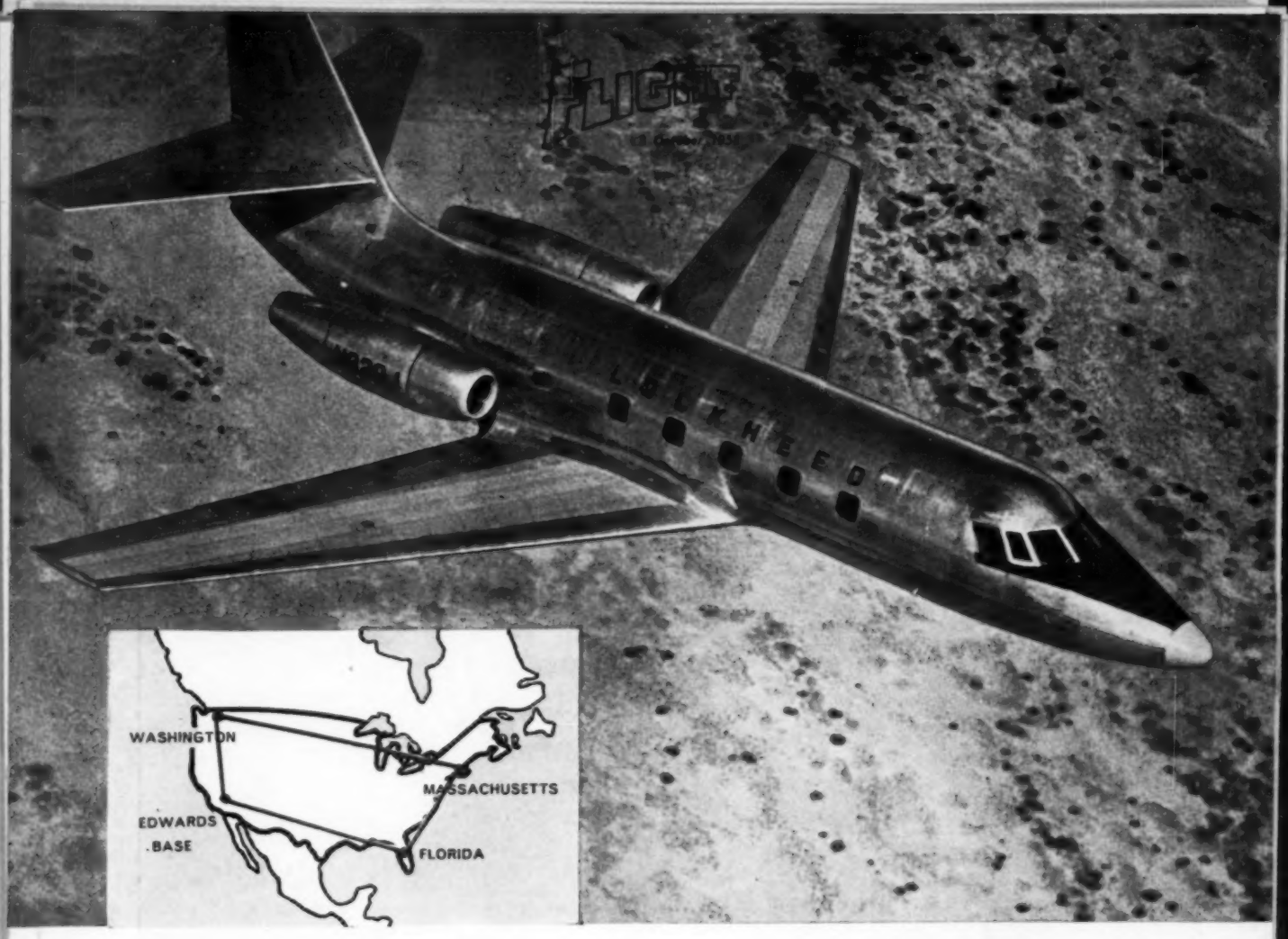

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